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Continuity of Learning Through TBM:
Technology-Based Modalities During and After Pandemic

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Abstract

The COVID-19 pandemic is definitely a health issue that has affected much of the sectors in the community. As a city, Santa Rosa has never been hindered by the present challenges brought by the COVID-19 pandemic, different calamities, and problems that need to be addressed appropriately. This investigated the learners' perspectives on their current capacity and its implications for learning continuity through technology-based modalities. These were investigated based on the availability of gadgets, internet connectivity, and their classroom learning experiences. As per select schools, out of the 28 public schools, select nearby senior high schools was the research locale. This study employed the convergent parallel design, which entails that the researcher concurrently conducted the quantitative and qualitative elements in the same phase of the research process, weighed the methods equally, analyzed the two components independently, and interpreted the results together. This study concluded that respondents favor modular distant learning. Most respondents who have difficulties in meeting the requirements were because of ICT limitations. Even though the majority of them have benefited from the assistance of their families and the local government, some of them are still having issues on their online capacity based on the indicated parameters. The emerging themes from the experiences and difficulties of learning amidst the pandemic were: Technology in Education; The Role and Function of Technology; Technology-based Learning Environment and Assessment; and Safety and Security. This study resulted with a proposed strategic plan - PAU, that can ensure the effective implementation of different learning modalities.

Keywords: Continuity of Learning, Technology-Based Modalities, Strategic Plan

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Introduction

The COVID-19 pandemic is unquestionably a health issue that has impacted many community sectors, particularly the school sector. The epidemic has impacted Santa Rosa as a city. All families have experienced the significant disruption, which has had a negative impact on the city's educational system as a whole. The problem highlights the conflict between keeping schools open during their regularly scheduled hours as required by law while both decreasing interaction and saving lives.

Thus, the educational system was forced to act quickly to adapt to the evolving nature of learning, and schools must respond to the massive disruption caused by COVID-19. In Santa Rosa City, different schools and institutions are being urged to create a resilient learning system utilizing data that is both evidence- and need-based so that proactive and responsive measures may be put in place.

As a continuing commitment, SDO Santa Rosa City has never been hindered by the present challenges brought by the COVID-19 pandemic, different calamities, and problems that need to be addressed appropriately. As mentioned by Martin Luther King, "The function of education is to teach one to think intensively and to think critically. Intelligence plus character – that is the goal of true education," which necessitates the division to work more productively and make everyone responsible for quality education that every learner deserves. Hence, education has never stopped during and after the pandemic.

The manner in which instruction and learning take place changes in crisis situations. When crises and calamities occur (man-made and natural) occur, educational institutions must be adaptable and discover new approaches to carry on the learning and teaching processes (Chang-Richards et al., 2019). One new reality brought upon by the world is the move to online learning platforms which is a response to the health problem to reduce the danger of in-person communication.

The new realities of our world, which place a strong emphasis on social isolation for health and safety, eventually call for changes to the ways that schools educate and learn. In order to support and equip schools and learning centers in creating a conducive learning environment and in complying with the quality criteria set in this new normal time, the Division of Santa Rosa City pledges to strengthening our mandate in this regard.

In this regard, the researcher aimed to investigate the issues and challenges in technology-based learning modality in the select schools of Santa Rosa City during and after the pandemic for the development of strategic actions for learning continuity.

Aim of the Study

This study aimed to investigate the issues and challenges in teaching and learning amid the pandemic through the eyes of faculty members and students as the foundation for the development of strategic actions for teaching and learning continuity.

This study specifically sought to answer the following questions:

1. What is the profile of the learners/students in terms of:
   1.1 Preferred flexible learning modalities;
   1.2 Problems in the completion of requirements due to ICT Limitation;
   1.3 Provision of additional/alternative requirements;
   1.4 Receiving of learning feedback; and
   1.5 Learning atmosphere/environment?

2. What is the profile of faculty and students in terms of online capacity as categorized into:
   2.1 Access to e-gadgets;
   2.2 Access to Internet connectivity/Wi-fi connection; and
   2.3 Stability of Wifi/internet connection?

3. What emerging themes from the experiences and challenges of teaching and learning amidst the pandemic can be developed?

4. From the salient findings of this research, what Strategic Plan for teaching and learning can be proposed?

Method

Context, Participants, and Procedures

This study used a convergent parallel design, which required the researcher to conduct both the quantitative and qualitative components at the same time, weigh the approaches equally, separately analyze the two components, then combine their interpretations of the findings (Creswell & Clark, 2011). A thorough study of the research problem was also offered by the convergent parallel design by merging or combining quantitative and qualitative data.

The use of both quantitative and qualitative methods was simultaneous. To determine the difficulties in teaching and learning, a structured online survey utilizing Google forms was conducted. Respondents had options to pick from in the Google form.

Quantitative Population/Sampling Procedure
In the quantitative section of the investigation, simple random sampling was used. A total of 288 students from the listed senior high schools were chosen at random to make up the study's population. The number of respondents per school division is shown in the Table 1.

Distribution of Respondents Per School

School	Learners
School A	95
School B	95
School C	98
Total	**288**

Qualitative Population/Sampling Procedure
In order to respond to study question number three, which examined learners' challenges and experiences, the qualitative method was adopted. The researcher was able to record the experiences and difficulties of the respondents by reading the narratives they provided in

response to the open-ended questions they were asked online. Themes that gave a clear description of the experiences and difficulties were used to examine the narratives.

Data Analysis

The validated and reliable-tested final instrument was converted to online Google Form. The converted instrument was sent through E-mail and Messenger of Social Networking Sites (SNS).

Since the survey was conducted online, retrieval of the data was through cloud computing using the researcher's Google Drive account, wherein it was automatically stored. Data Privacy form and Informed Consent form were given to both respondents for the signature, acknowledging their participation in the whole research process. Lastly, data analysis, interpretation, and thematic analysis were performed accordingly.

Quantitative Part
Data were analyzed to provide a clear picture of the setting and experiences of learners after obtaining the quantitative and qualitative findings. The information was utilized to create a scenario, analyze it, and then use the findings to decide on the strategic activities for teaching and learning continuity. Scenario analysis is a method for predicting outcomes under the premise that a phenomenon would continue in the future (Kishita et al., 2016).

This strategy is helpful for investigating likely future events that might or might not occur (Bekessy and Selinske, 2017). With the help of this method, which creates a theoretical scenario of the best-case (optimistic) or worst-case (pessimistic) scenario for behavior in response to an unexpected event like the pandemic, the researcher was able to develop a comprehensive strategic plan for the continuity of teaching and learning (Balaman, 2019).

Qualitative Part
In order to respond to study question three, which examines the difficulties and experiences of the learners, the qualitative method was adopted. Online open-ended questions were utilized to gather the respondents' narrative responses so they could talk about their struggles and experiences. It provided a detailed account of the experiences and challenges; the tales were then assessed thematically. The researcher then created hypothetical scenarios that served as the foundation for adaptable strategic actions that the schools could take depending on the community quarantine classification and the local health situation where the schools are located. This was done after the researcher analyzed quantitative and qualitative data.

Results

This study was conducted in select nearby senior high schools. These were used by the researcher to compare the continuity of teaching and learning in the Division of Santa Rosa City during and after the pandemic. The conduct of this study in these research locales were pursued since it will greatly help the SDO Santa Rosa City track the status and adherence of schools to the relevant policies of the said department. Moreover, it helped them determine the continuity of learning can be adapted by other divisions or nearby schools to ensure the effective continuity of education during and after the pandemic situation.

The researcher made use of both descriptive and inferential statistics in analyzing the data collected from the respondents.

1. The Profile of the Learners in Terms of:
      1.1. Preferred flexible learning modalities;
      1.2. Problems in the completion of requirements due to ICT Limitation;
      1.3. Provision of additional/alternative requirements;
      1.4. Receiving of learning feedback; and
      1.5. Learning atmosphere/environment.

Table 1: Profile of learners in terms of Preferred flexible learning modalities

Learning Modalities	Frequency	Percentage
Modular Distance Learning	111	35.54
Online Distance Learning	86	29.86
TV/Radio-Based Instruction	0	0
Blended Learning	71	24.65
Homeschooling	20	6.94
Total	288	100

Table 1 shows that most of the respondents prefer Modular Distance Learning (35.54%) which can be inferred that most of them have been exposed to this modality since they had undergone modular distance modality for the past two (2) years due to the pandemic. This is also true since they have been provided with the modules that they use as their learning materials, both printed and digitized modules. They were fortunately provided by the Local Government as a way of continuing education in the city. The digitized modules were stored in the On-The-Go (OTG) flash drives and then transferred to their mobile devices. Consequently, it was followed by Online Distance Learning with 29.86% of the total responses; Blended Learning with 24.65%; and 6.94% for Homeschooling. It can also be seen that none of the participants chose TV/Radio-Based Instruction because it is not available in their communities.

**Table 2: Profile of learners in terms of completion of requirements
due to ICT Limitation**

Statements	WM	VI
E-gadgets are too costly or expensive	3.54	Strongly Agree
Demands too much time be spent on technical problems	3.25	Agree
Effective only when extensive computer resources are available	3.57	Strongly Agree
Limits my choices of instructional materials	2.63	Agree
Requires software-skills training that is too time consuming	2.51	Disagree
Composite Mean	**3.10**	**Agree**

4 - 3.25-4.00 (Strongly Agree); 3 - 2.5-3.24 (Agree); 2 - 1.75-2.49 (Disagree); 1 - 1-1.74 (Strongly Disagree)

In Table 2, Profile of the learners in terms of completion of requirements due to ICT Limitation, it is observed that most of the respondents or 3.57 strongly agree that it can only be effective when extensive computer resources are available. It was followed by the indicator that e-gadgets are too expensive with 3.54 as weighted mean, wherein most of them strongly agree that they are being limited with the completion of their requirements due to expensive gadgets that they need. It is also observed that they agreed on the two other

indicators that it demands too much time be spent on technical problems, and limits their choices of instructional materials. On the other hand, they disagreed that it requires software-skills training that is too time consuming, which means that they can easily adapt to the ICT environment. The composite weighted mean of 3.10 shows that they agreed on the ICT limitations that they encounter in completing their requirements.

Table 3: Profile of learners in terms of additional/alternative requirements

Statements	WM	VI
Requires extra time to complete the learning activities	3.51	Strongly Agree
Makes classroom interaction becomes easier	3.37	Strongly Agree
Helps accommodate students' personal learning styles	3.16	Agree
Motivates students to get more involved in learning activities	3.29	Agree
Results in students neglecting important traditional learning resources (e.g., library books).	3.42	Strongly Agree
Composite Mean	**3.35**	**Strongly Agree**

4 - 3.25-4.00 (Strongly Agree); 3 - 2.5-3.24 (Agree); 2 - 1.75-2.49 (Disagree); 1 - 1-1.74 (Strongly Disagree)

In this table, it can be gleaned that most of them strongly agreed in the stated indicators. Among them, Indicator 1 with 3.51 weighted mean showed that they are required to spend extra time to complete learning activities. It was followed by the idea that students neglect important traditional learning resources with 3.42 weighted mean; and classroom interaction becomes easier (3.37). These indicators manifest that the respondents are aware of the pros and cons that they encounter when they are given additional or alternative requirements using the technology. Additionally, they concurred with the claims that ICT supports students' individual learning styles (3.16) and motivates them to participate more actively in educational activities (3.29). The composite mean of 3.35 means that they strongly agreed that the experiences they have with the additional/alternative requirements using ICT are taken into consideration.

Table 4: Profile of learners in terms of receiving of learning feedback

Statements	WM	VI
Improves student learning of critical concepts and ideas	3.54	Strongly Agree
Eases the pressure on the learners	3.28	Agree
Is successful only if technical staff regularly maintains computers	3.43	Strongly Agree
Is successful only if there is the support of parents	2.76	Agree
Will increase the amount of stress and anxiety students experience	2.91	Agree
Composite Mean	**3.18**	**Agree**

4 - 3.25-4.00 (Strongly Agree); 3 - 2.5-3.24 (Agree); 2 - 1.75-2.49 (Disagree); 1 - 1-1.74 (Strongly Disagree)

The indicator for improving student understanding of important concepts and ideas received the highest weighted mean (3.54), as shown in Table 4, while the belief that learning

feedback can only be successful if the technical staff regularly maintains the computers or e-gadgets that they use received a weighted mean of 3.43. This demonstrates that the respondents concur that learning feedback must be properly given with the assistance of specialists. As a result, the majority of them agreed on the following three additional indicators: Reduces pressure on students (3.28); Will raise the amount of stress and anxiety students suffer (2.91); and Is only successful with parental support (2.76). It manifests that feedback mechanism in the technology-based learning modality is crucial for them and must be done with proper guidance and technical skills. Its composite mean of 3.18 also shows that most of them agree in all the indicated parameters when receiving of learning feedback is concerned.

Table 5: Profile of learners in terms of learning atmosphere/environment

Statements	WM	VI
Is only successful if computer technology is part of the students' home environment.	3.36	Strongly Agree
Is a valuable instructional tool	3.31	Agree
Is successful only if there is the support of parents	3.37	Strongly Agree
Is difficult because some students know more about computers than many parents do	3.42	Strongly Agree
Is only successful if traditional approaches are part of the students' environment.	3.25	Agree
Composite Mean	**3.34**	**Strongly Agree**

4 - 3.25-4.00 (Strongly Agree); 3 - 2.5-3.24 (Agree); 2 - 1.75-2.49 (Disagree); 1 - 1-1.74 (Strongly Disagree)

The majority of respondents, as shown in the table, strongly concur with the following statements: is difficult because some students are more computer literate than many parents (3.42); is only successful with parental support (3.37); and is only successful if computer technology is available in the students' homes (3.36). This determines their stance on the ICT learning environment for technology-based modality for the continuity of education during and after the pandemic. They believe that the enumerated considerations must be taken into account when ICT is applied in the learning atmosphere. If the e-gadgets and equipment are not available at home, it will not be successful, especially during online classes. Technical divide can also hinder their learning when parents do not seem to understand their needs in ICT gadgets and learning materials. Their parents must give the full support to the demands of technology. However, some parents do not have the capacity and the skills to support the learners and provide for all its demands.

Technovation has been identified by the Division to be its foremost goal through its banner program B2B-SRC (Be Efficient, Be Empowered, Be Excellent in Santa Rosa) by ensuring the provision of e-learning gadgets and equipment to the learners. Technological innovation has been the trend in this new normal learning environment to which LGUs and external stakeholders give their utmost support to all the needs and demands of the educational system (Mangubos, 2021). This makes the City becomes a good venue in providing technology-based learning environment for its learners.

2. The Profile of Learners in Terms of Online Capacity as Categorized Into:
2.1 Access to e-gadgets;
2.2 Access to Internet connectivity/Wi-fi connection; and
2.3 Stability of Wifi/internet connection?

**Figure 1: Profile of the learners in terms of online capacity
as categorized into access to e-gadgets**
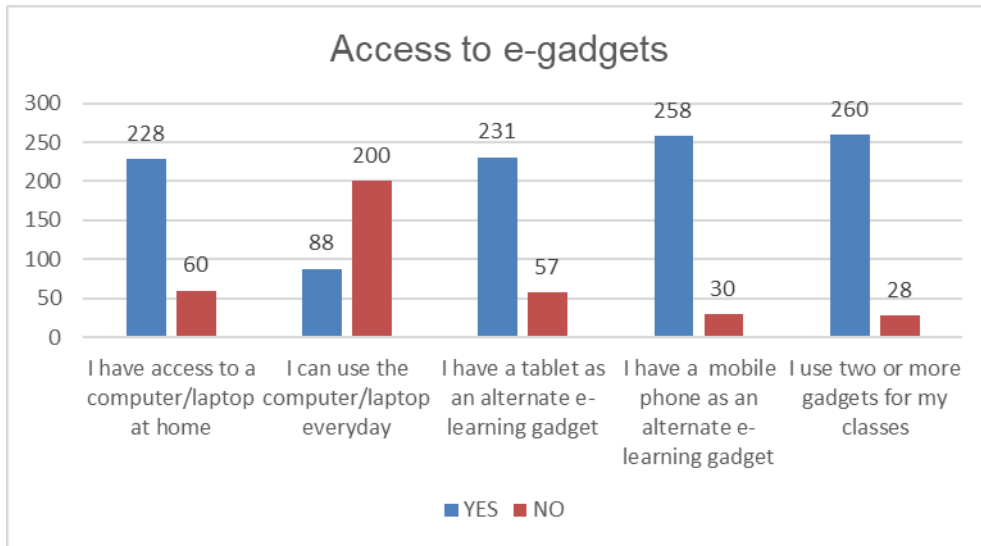
Figure 1 shows that most of the learners (228 or 79.17%) of the learners have access to computer/laptop at home; while only 88 or 30.56% of the total respondents said that they can use the computer/laptop every day. This means that most of them do not own the computer/laptops available at home and share it with the other members of the household. However, 231 or 80.21% of them said that they have an e-tablet that they can use. This is because of the provided e-tablets for the Rosenian learners from the Local Government. It is under the goal of Technovation in the city. Likewise, 258 of the total respondents or 89.58% of them also said that they have mobile phones as an alternate gadget for technology-based learning modality. Thus, 260 or 90.28% of them answered that they use more than one (1) e-gadget in their preferred learning modality.

**Figure 2: Profile of learners in terms of online capacity
as categorized into access to Internet connectivity/Wi-Fi connection**
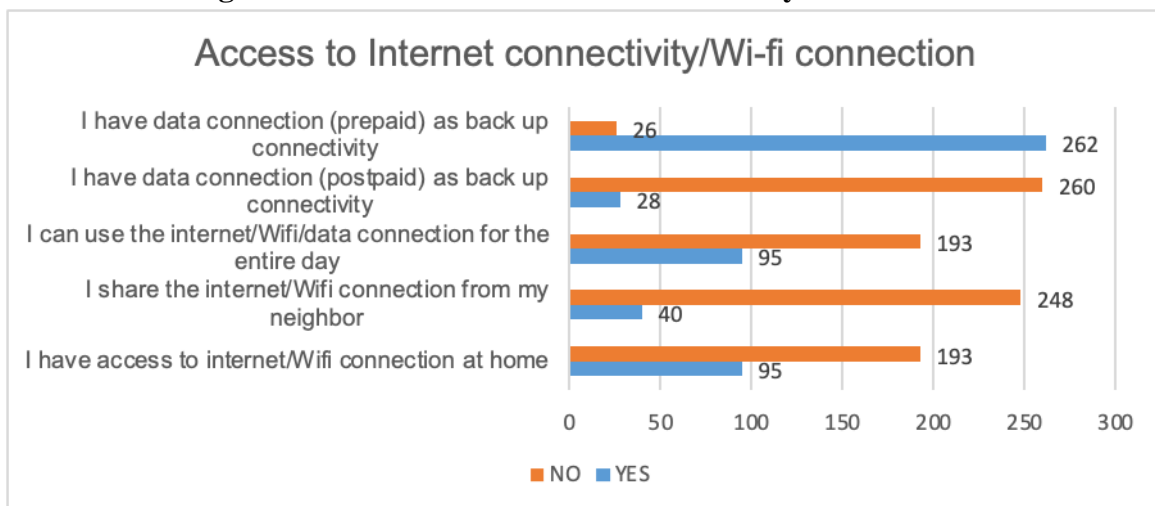
In the figure above, it shows the online capacity of the respondents based on their access to Internet connectivity/Wi-fi connection. It shows that most of them (262 or 90.97%) utilize prepaid connectivity as back up for their online classes. Only a few, 28 respondents or 9.72%, have postpaid connection that they use when Wifi connection is not available. When it comes to their Wifi/data connection usage, only 32.99% or 95 respondents said that they can use their connection all day long. With regard to sharing Wifi connection from their neighbors, only 40 or 13.89% have that situation, while 95 respondents or 32.99% have their own Wifi/data connection at home.

Figure 3: Profile of the learners in terms of online capacity as categorized into Stability of Wifi/internet connection
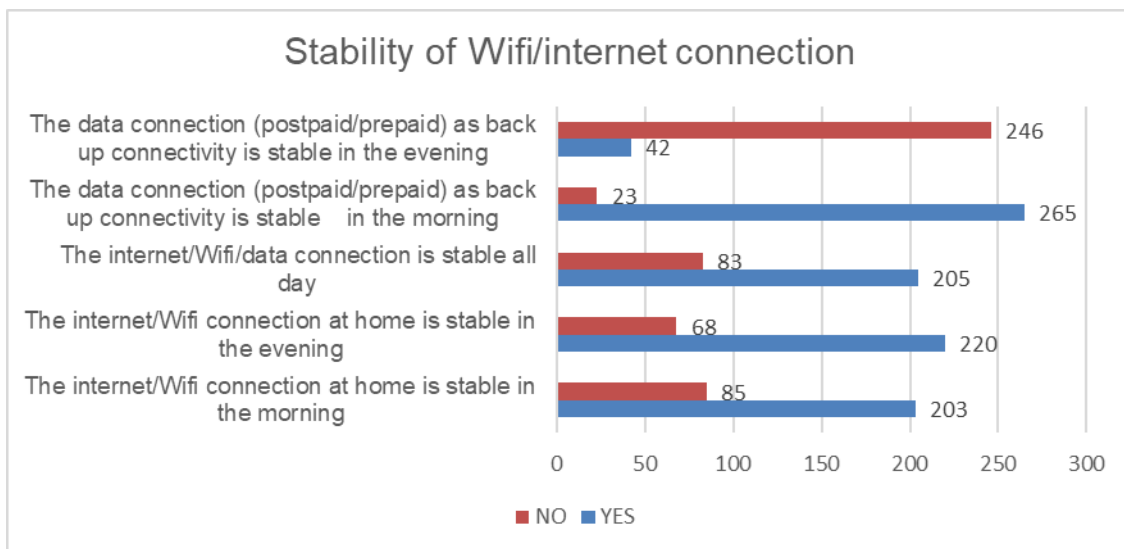
For Figure 3 on the Profile of the learners in terms of online capacity as categorized into Stability of Wifi/internet connection, 93.01% or a total of 265 respondents said that data connection (postpaid/prepaid) as back up connectivity is stable in the morning, while 14.58% or 42 respondents have poor data connection at evening. On the other hand, there are 203 respondents or 70.49% with stable internet/Wifi connection at home is stable in the morning, close enough with the 220 of them or 76.39% experience strong internet/Wifi connection at home in the evening. While 205 or 71.18% of the total respondents said that they have stable internet/Wifi connection at home for the entire day.

The results of the survey proved that Santa Rosa City can take advantage of the good internet/Wifi connection of the learners. It is also one of the reasons why technology-based learning modality became possible in the city. Fabella (2021) mentioned in his narratives SDO BE-LCP that the Schools Division of Santa Rosa City boosts its effort to expand the role and importance of ICT in improving the quality and delivery of education and support the teachers in the integration of ICT in the teaching-learning process. Guided by different programs and projects implemented in central and regional level, the ICT Unit implemented different programs and projects that support technology-based learning modalities.

3. What Emerging Themes From the Scenarios Based on the Experiences and Challenges of Learners Amidst the Pandemic Can Be Developed?

Theme 1: Technology in Education

Theme 1, based on the narratives and best scenarios of the learners imply that there is a strong need for the development of technology in education. Learning with technology is only possible if students are technologically literate, which implies a two-step process in which students first learn about the technologies before they can really utilize them to study. However, there have been initiatives to combine the two strategies. Learning about computers and the Internet is combined in this method. It entails teaching the technology skills "just-in-time," or when the student needs to learn them while participating in an activity.

Theme 2: The Role and Function of Technology

The learners have repeatedly brought up the importance of technology, particularly an internet connection, in the overarching narratives about how learning is delivered and assessed, it implies that if everyone was aware of this issue in the crisis situation, learners may eventually return to the regular learning activities outside of the classrooms. According to survey findings, the majority of students and some faculty members live within the city and have internet access.

The technology required for students to interact with each other effectively is another important component to take into account in addition to the internet. In the absence of these, it is necessary to assess the strategy employed during the learner interaction. The problem would be how to create an inclusive IT infrastructure to deliver top-notch instruction to all students given the current health crisis and the change in how education is delivered.

Theme 3: Technology-Based Learning Environment and Assessment

In the gathered narratives, this theme focused on the learning environment and the assessment of learning. When schools instantly turn to online learning as the most practical method of delivery of learning and to alleviate the disruption of classrooms and support continuity of learning. Under this new educational structure, students must stay at home and relocate their classrooms to the same location. However, it is somewhat disregarded that students have various home environments and living circumstances that may affect their learning environment and assessment process through submission of their outputs.

Most of the time, families regularly involved their kids in educational activities. However diverse patterns were seen across various social categories. Low socioeconomic position families and residents of underprivileged areas offered fewer learning opportunities. The reason for this may be in part due to the fact that it can be challenging for families that are economically and socially disadvantaged to obtain the financial and social resources necessary to create an engaging technologically-based learning environment at home.

Theme 4: Security and Safety

Concern for their safety and security is a typical emotion among the parents of the learners in the situations that have been identified based on the provided narratives. According to

Maslow's Hierarchy of Needs, the administration and personnel at the school give priority to students' fundamental needs. Students and professionals have stated that safety and the psychological signs of infection worry are their top concerns (Smith, 2020). It was found in another study that due to job loss, family member loss, and the uncertainty of traveling to the school, the concerns on focused on security and the prospect of continuing education.

The schools must give students access to significant support in order to deal with the hardships, obstacles, and even trauma caused by the pandemic in light of the issues mentioned by the study's respondents. Programs for mental health must be available in formal educational contexts. The tremendous difficulties that students and teachers faced during the epidemic made it less likely that they would be able to successfully complete formal education if their general well-being was weakened.

4. Proposed Strategic Plan for Students' Learning

Proposed Strategic Plan	Technology in Education	The Role and Function of Technology	Technology-based Learning Environment and Assessment	Security and Safety
Prime	Innovative programs in learning modality through technology	Alternative e-services delivery of learning resources	Online and technology-based sites for students' activities and engagement	The arrangement of the classroom with physical distance by student desks for blended learning
Amplify	Upskilling in new normal learning methodologies	Online system for services with some physical transactions when needed	Flexible and adaptive online learning outcome-based assessment	Virtual classrooms for all learning modalities
Utilize	Learning management system to address issues during and after the pandemic	Fully operational learning management system for classes in different modalities	Alternative home-based activities with modified assessment policy"	Support from the LGU, stakeholders, and the community for safety and security

From the generated themes on the salient findings of this study, this Strategic Plan P.A.U. (Plan, Amplify, and Utilize) was designed. This plan can be used as a guide to make school plans in technology-based learning modality for the continuity of education.

Conclusion

1. Respondents favor modular distant learning, according to the learner profile in terms of preferred flexible learning modes. Most respondents who have difficulties in meeting the requirements were because of ICT limitations. While, they firmly agree in the indicators based on their experiences in the supply of additional/alternative criteria. They also strongly agree with the stated indicators based on their personal experiences obtaining feedback on their learning and the learning environment.

2. It was concluded that there are learners who still struggle with using technology when their online capability was categorized into access to e-gadgets, access to Internet connectivity/Wi-fi connection, and stability of Wi-Fi/internet connection. Even though the majority of them have benefited from the assistance of their families and the local government, some of them are still having issues on their online capacity for their studies based on the indicated parameters.

3. The following were identified as the emerging themes from the experiences and difficulties of learning amidst the pandemic: Theme 1: Technology in Education – Students can only learn about technology if they are technologically literate; Theme 2: The Role and Function of Technology – The use of technology is essential when creating materials for online or remote learning in order to maximize their class participation; Theme 3: Technology-based Learning Environment and Environment - necessitates a platform that involves cooperation among educational institutions, parents, and other stakeholders that gives students a quality technologically- based learning environment; and Theme 4: Technology-based Learning Environment – a place where school staff and administration prioritize the basic needs of the learners in safety and security.

4. A strategic plan is needed in order for a technology-based learning modality to become possible. This study resulted with a proposed strategic plan - P.A.U. (Prime, Amplify, and Utilize), that can ensure the effective implementation of different learning modalities.

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Practice of Knowledge Presentation in Tunnel Engineering Teaching

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Abstract

High education situation is increasingly challengeable. The courses in traditional fields would surfer more squeeze from the changing environment. The teaching style should accordingly be robust and more favorable to student knowledge acquisition. Here is the practice of knowledge presentation in Tunnel Engineering teaching at Chang'an University in China. The presentation style is part of the course design, with the considerations of the features of the course content and experiences. The contents consist of the knowledge sections related to both the foundations to Tunnel Engineering and major professional knowledge, including the planning, design, construction, operation and management of tunnels and underground structures, respectively. To be favorable to the student-centered procedure, the course presentation is systematically designed in terms of specified knowledge points, such as, concept, information or facts, experiences, theory and principle. Each of the knowledge points is presented in a progressive and flexible mode in terms of learning content and complexity. The efficiency and robust of the knowledge presentation are checked by student learning result evaluation, with the indexes of the student's knowledge learning levels. The practice results indicate that: (1) students are skillful to obtain course information, but most of them are frequently confused in information sampling, concept and knowledge system developments; (2) course instructors should focus on the presentation of key concepts, the connections of the knowledge points, student's learning skill and capacity development; (3) adequate evaluation and active motivation are necessary and favorable to student self-enhancement and knowledge building metacognitively.

Keywords: Knowledge Presentation, Teaching, Learning Evaluation, Tunnel Engineering

Introduction

Education quality is vital to a nation and society in this new era. As information is accumulating in an unprecedented manner, we are in a changing world. Information, especially digital issues, plays an increasing role in personal lives and social activities. At the same time, education is highly challenged. High education would play an active role (Ma, 2023). The results of learning and teaching is always one of the key points in education. As a teacher, one of the tasks is to make a teaching effective in terms of knowledge presentation.

In modern society, to make a nation truly dynamic, engineering education should play a fundamental, global, and leading strategic role in social development (Li, 2020). This means that engineering education needs to face the social developing challenges (NASEM, 2018). Educators need knowing how to take advantage of the development and application of contemporary technology in the social development. This trend will be increasingly significant in the future (OECD, 2015). Some emerging engineering education models (Graham, 2018; Stanford2025) or New Engineering Education Plan (Li, 2020) have been in practice to meet the requirements. The well-recognized innovations, in terms of learning and teaching styles, include Massive Open Online Course (MOOC), Small Private Online Course (SPOC), Flipped Classroom, as well as the innovation program in new engineering education, such as the Open-loop University in the Stanford2025, the education styles at the Olin College of Engineering. All of these well-accepted learning and teaching styles prefigure changing in the conventional course presentation.

To adapt to the explosive growth of the knowledge, there are new courses being added to meet the requirements of the new industries and some courses are even cancelled in the curriculum at a university. As a result, a course for a specialty in civil engineering, such as Tunnel Engineering will share less time period. On the other hand, the contents of the existing course are also increasing with time. Therefore, the presentation of a traditional course is challengeable in this changing situation. In terms of student-centered principle, the teaching style should accordingly be robust and more favorable to student knowledge acquisition. Here is the practice of knowledge presentation in Tunnel Engineering teaching at Chang'an University in China.

Situation of the Course

The new information presentation and communication modes are generally beneficial to our living, studying and working. However, it is challengeable for an individual to take advantage of the information available. In brief, we seem enjoy an informational society, however, it is increasingly challengeable for a learner or presenter to cope effectively with the information around us. Course presentation would be helpful to the students' incorporating the sampled information into their knowledge system. The situation of an engineering professional course is of the following features. (1) The information related to a traditional professional course is easily available to students. The quantity of the information is increasingly accumulated with time. This means the information presentation of a teacher should shift from conventional mode to a new style to adapt to the new situation of course information. (2) The modes and forms of the course information are increasing with time. (3) It is challengeable to present the information with conventional way. (4) What is important to students is of personal features. (5) A proper quantity and style (way) to present a specified content is of dynamic feature.

1. Society Requirements

Social hot points or the requirements for a specified knowledge is generally shifting with a time interval. For students being adaptable, education activity should skillfully manage the focus on general knowledge and specified one, respectively. A professional engineer is generally much fit to a specified engineering position. However, a prospective institution needs not only adaptable personnel, but also creating or leading a new engineering field. Practice has given well indications that a super large company would have a super-conventional development stage, which has been founded on the innovation or creation of a new field. Therefore education should be timely tuned, with the knowledge building and capacity development of the students underlined and keeping her key features.

The social requirements are met in fulfilling personal needs. Student-centered course design and plan implementation would focus on student's capability development. Course presentation would contribute to the education objectives. Although various factors will have influence on the results of the learning and teaching achievements, it is one of the key points of course presentation to help students' knowledge building and capacity development. In practice, the course presentation will be with college characteristics, such as in terms of knowledge-level, personal abilities, and objectives. There are well-accepted parameters of personal capacity in social evaluation field, such as the Bloom's taxonomy (Anderson & Krathwohl, 2001) in thinking skills and cognitive domains (Figure 1). Of the parameters, creative thinking is the in the top-level or higher-order.
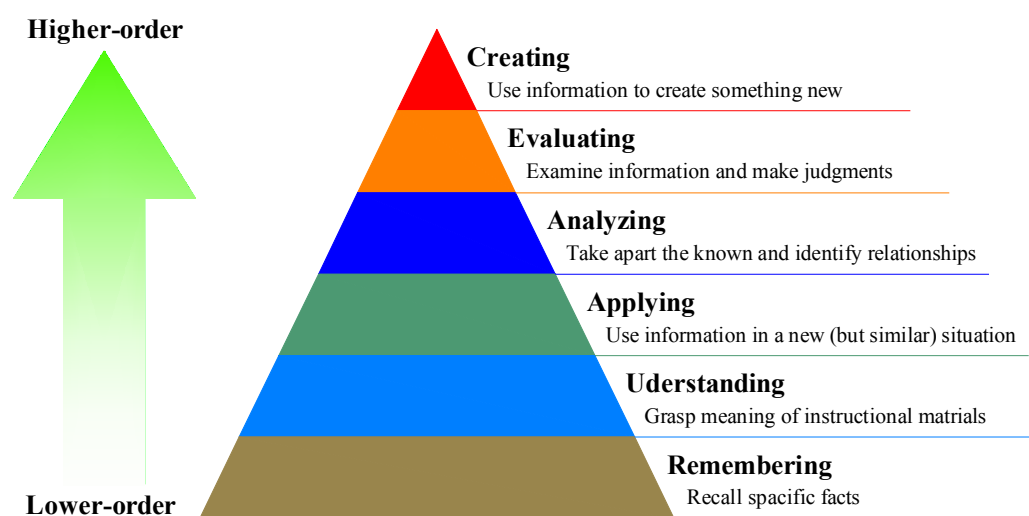
Figure 1: Sketch showing Bloom's taxonomy (2001) in thinking skills and cognitive domains

2. Techniques Applied in Learning and Teaching

Many information presentation styles are emerging in digital forms. Education is in a constantly changing era. Course would be presented in a traditional way, such as speaking, writing on a blackboard, body language, projector showing, as well as in a digital mode of PPT, video, flash, etc. On the other hand, knowledge presentation could be face to screen through online. It is not an easy job to effectively use the techniques available in practice (Ma, 2023). Teachers should skillfully manage the techniques, especially how to effectively to apply available technology at a specific learning and teaching issue or knowledge point.

This also include guiding professional information sampling, such as through database available.

3. Design of Course Presentation

Learning is a process of the interaction among the students, teachers and knowledge and would take place under certain context (Kozulin et al., 2003). As shown in Figure 2, the results of a course teaching depends on various factors, such as the competence of the instructors and students, learning environment, facilities available in teaching and learning procedure, features of the interaction between instructors and students. The course presentation should be well designed in terms of improving teaching quality and the students' knowledge building and capacity development.

In practice, course presentation is performed in a dynamic situation. The content and difficulty of the course points is changing. The students' learning capability is various and changing. The design of the course presentation should be dynamically tuned, in terms of course content choosing, presentation styles, interaction between students and staffs, as well as effect evaluation. For each presentation, the design should consider the learning objectives, instructional strategies and assessments, such as in terms of the content to be taught, the intentions and performances of both the students and staffs involved, evaluation measures. In the design, learning objectives, teaching strategies and assessments should be closely aligned so that they reinforce one another. The assessment should focus on the level of student achievement indicating the learners' knowledge building and capacity development, especially the potential progress in the future (Daneshfar & Moharami, 2018).
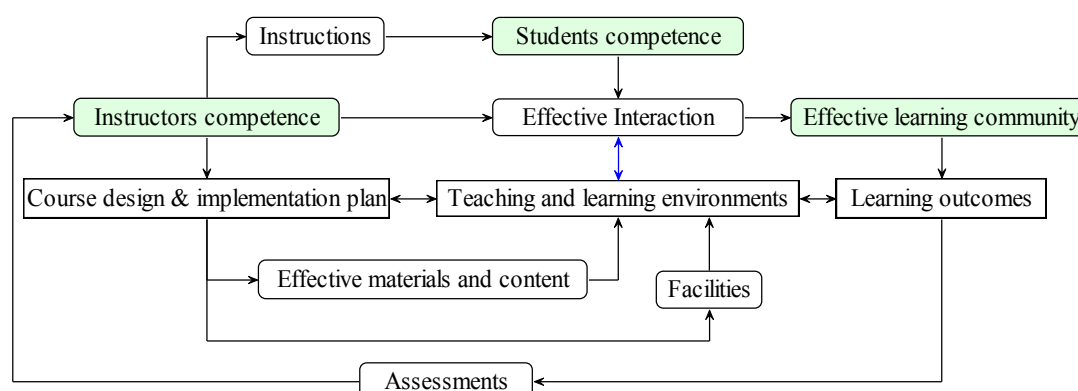
Figure 2: Sketch showing the factors relating to learning results

4. Implementation in a Dynamic Mode

A well-designed course presentation should include content choosing, implementation and delivery plan in details. To be favorable to the student's knowledge building and capacity development, the implementation would be actionable, such as with specific content and presentation styles (Ma, 2023). The learning outcomes should be timely assessed with the assumed criteria. Based on the feedback and evaluation results, the course design and implementation plan will be tuned in a dynamic way (Ma, 2022, 2023). The evaluation results of the students' learning outcomes are reference level of the presentation adjustment.

Practice of the Course Presentation

To be favorable to the students' knowledge building and capacity development, the presentation of the course Tunnel Engineering at Chang'an University is designed and tuned accordingly, in terms of content choosing, interaction between students and staffs, as well as effect evaluation.

1. Course Features and Content Sampling

The Tunnel Engineering should include planning and design, construction, operation and management in a system mode (Ma, 2022). In the course information sampling and presentation design, the content should be specified to each step and stage in the learning and teaching procedure, respectively. For example, considering the students' knowledge building procedure and the course features in terms of the relationship between information, concept, structure and their components, activating points are designed to increase student engagement and systems thinking application (Ma, 2022), with evaluation measures and scales under consideration. Considering the development and usage of underground space are increasing, such as in terms of types and complexity, the information and knowledge system related to the subject Tunnel Engineering are accordingly accumulated with time. To make the course teaching in the pace of the engineering practice, there are new points in course presentation.

In the learning and teaching procedure, we start from concept, which is presented in terms of information. With more information and concepts are learned, students would develop professional knowledge to think in terms of engineering issues. In this process, personal capacity development is vital to the learning and teaching results. It is noted that we can only partially present the complex concept or meaning at a time or stage. How to make the related information being effectively presented and also to be favorable to students accepting, a proper presentation style and implementation plan would be well designed, as well as checking measures, such as testing with informative and summative modes, respectively.

Although we start presenting a course from simple concept with specified information, we need design the presentation in a system mode. The meaning of a concept should be presented with comprehensive considerations. For example, the concept tunnel structure is first presented in a narrow meaning, which means that tunnel structure is same as lining-style supporting system, applied around the tunnel excavation profiles. However, the supporting systems in tunnel engineering have developed into multiple-style modes. A primary supporting system applied in a modern mined tunnel could be partially installed into surrounding rocks, such as rockbolts or dowels, while other items, such as steel sets and shotcrete lining, are built inside of the excavation profile. On the other hand, the structures of a mined/bored tunnel should include both supporting system and surrounding rocks in terms of general meaning. The features of the tunnel structures would strongly depend on the nature of the interaction between the tunnel supporting system and the surrounding rocks. It is important understanding the dynamic feature of tunneling in terms of the tunnel surrounding rock properties and the interaction between the tunnel supporting system and the surrounding rocks. This is mainly because the properties of involved factors, such as the supporting system and surrounding rocks, vary during the tunneling process and after the supporting system being built. The key points of a presentation would be changing and a proper presenting mode should be well designed and prepared in the content sampling, with the subject features under consideration.

2. Modes of Presentation

Teaching is to help students realize the transform from information accepting, such as a receiver, into an information assimilating one in terms of knowledge building and capacity developing. As we present a course starting from information, concept, we need to help students transferring specified information, concepts into subject principles, rules, theories, as well as thinking ability. It is vital to make the information separated being assembled into a student's knowledge system. The results of this dynamic process would depend upon the followings: (a) features of personal capacity building in a professional field; (b) nature of the knowledge as a subject, such as the empirical or custom features, analogical method and working way in the professional field.

We divided the subject into learning and teaching points, as shown in Figure 3. Each point is presented with specified information and the presentation styles or modes would be specified in terms of words, figures, photos, videos, etc. With the presented information, we can demonstrate the meaning of a concept. Both information and concepts are components of personal knowledge. So, it is vital to make use of the accumulated information and concepts to build personal knowledge. The more effective of the transferring process of assembling the information and concepts into one's knowledge system, the more favorable of the course presentation to students' learning process. The checking of the knowledge building and capacity building results would use the indexes of the thinking skills, as shown in Figure 1. For example, assigning a task to analysis a case with the learnt theory and principles, and to make a decision on the specified problem. There are analogical methods to follow, such as through learning on case histories, rules from design codes, guidelines.
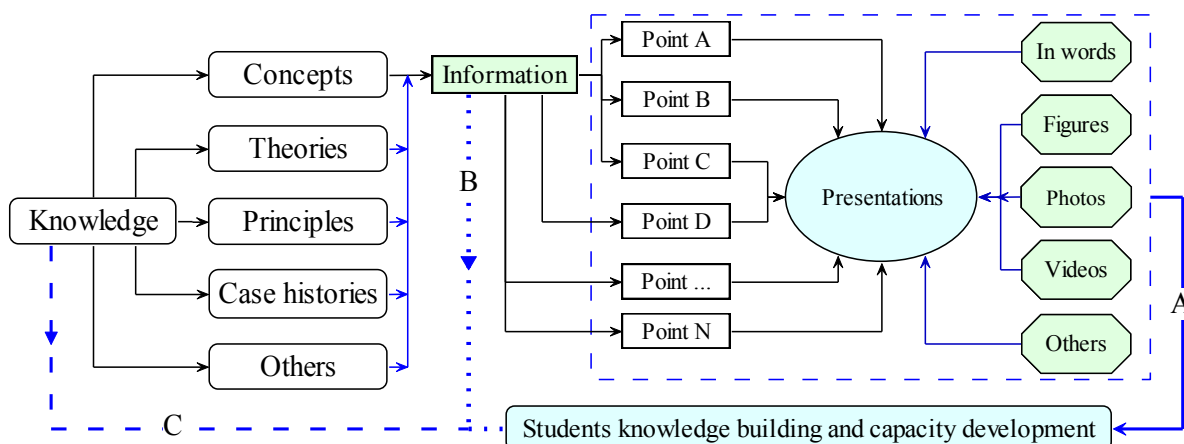
Figure 3: Sketch showing the course presentation tactics with student's knowledge building and capacity development under consideration

It should be noted that teaching is not just to present information, concept, theory, principle, and experience from case histories. It is important to help students to realize transferring the information into thinking skills, esp., critical thinking to use the knowledge to analysis, as following the route A in Figure 3.

3. Post Evaluation

In practice, the presentation types could include measures in class and out of class, being related to where and how to teach and learn. The results of the learning and teaching procedure should be timely checked through both informative and summative modes. There

are a variety of evaluation methods, including process evaluation, diagnostic evaluation and summative evaluation. A well-designed mode is in corresponding to the specified learning and teaching points. Effective reflection to the goal achievement or the students learning outcomes (Figure 2) is helpful to the next learning and teaching procedure, especially for the improvement of the presentation design and its implementation plan.

In general, the results should be positively evaluated in time, such as to meet the student's various intentions of capacity development. The applied approach should be supported by the viability of the specified goals, the enthusiasm of the participants, the applicability and timeliness of the course information and resources. As students' learning outcomes are evaluated, the presentation design and its practical effects are therefore checked in time, such as through discussion with students in a partnership way, quiz, test and assignment on the related learning contents. The experience shows that it is favorable to the student's capacity development that the students' performances are evaluated in an excitation (Ma, 2023).

Discussion

As the above-mentioned that the time for a course is limited. To do right things is vital to make the learning and teaching procedure effective. However, what is favorable measures at a specified time or stage, is a problem in course presentation design and plan execution.

1. Course Presentation Situation

We are in a digital age. Most of the information related to a course could be presented in a digital mode and is readily available to a learner. However, most of the students are not skillful enough in information sampling, especially in taking advantages of the database in digital literary at university. There needs additional information to guide students how to skillfully use the database, with special reference to a professional course learning.

Traditional mode is necessary but not total. Online learning or face to screen mode is of high flexibility and there are less restriction in students learning modality via the Web (Paul & Jefferson 2019). Online technologies would be favorable to students' creative thinking development provided there is a useful interactive e-learning strategies and techniques, tools and activities for developing teaching methods (Wen, 2023), but there is a huge gap between information available and personal knowledge building and capacity developing. A qualified college student would be of skillfully thinking, since modern intelligent would be able to solve problem, such as taking responsibility and making decision in practical situations.

Digital information should be skillfully managed. Online interaction is favorable to guiding, discussion, question and responding, but is would be not as effective as traditional face to face mode, esp., for new knowledge teaching and learning. In presentation design and plan execution, there are underling key points at a specified learning and teaching phase, with students capacity development checking and evaluation under consideration. The evaluation parameters would not only follow a textbook, but also be of college features, as well as with additional skills, such as information sampling in this digital situation.

In the recent years, it is often said that novice graduated from a college could not work with their knowledge in practice. Students know enough but not well qualified. We need consider the features of information and knowledge accumulated in the course learning procedure. If there is no effective connection between the information in brain and the practical problems,

there are not enough skills and capacity to present the practical problem with their own knowledge system in a logical mode. For example, of the factors related, which will determine the features of the procedure? What are the influence factors in the process? How will the results be developed? These information related to a practical problem could not effectively presented and analyzed in corresponding to personal knowledge system.

In a system mode, we need focus not only theories and principles, but also the skills or levels of thinking. Theory is not the full of a practical professional work. There need personal thinking to cope with a practical problem. For example, where we make use of theories and principles in practical problem, we need consider the specified pre-conditions, practical parameters of the project, which are often not fully available or limited. This means we need consider a practical problem in terms of a professional thinking or in the application of an analogical method. In this procedure, personal engineering judgement or empirical method would play a key role in a decision making. All of these require professional thinking or capacity development. It is favorable and also college characteristics to train students professional thinking in the course procedure, such as in face to face lecturing.

On the other hand, what are students believe in are more important than the others. If students have an active starting and believe in themselves, they would have a good chance of being well and effectively involved in the learning and teaching procedure, such as in terms of deep thinking and learning, with critical thinking in learning, reflection involvement. Positive emotion would contribute to learning outcomes (Goetz et al., 2014). In general, what is important to the course presentation is not equally considered by the learners and teachers, esp., at the beginning of the course procedure. There are choices for personal interests or capacity development, considering the difference in learner's competence. Ability, interest and personality are important factors in shaping success (McCabe et al., 2020).

Course presentation design and plan execution should be a dynamic procedure, with interactions among students, teachers, environments and facilities etc. Considering students' performances are more decisive to the level of the learning outcomes, course presentation should be well-designed and the implementation plan be well-known, especially making it known to students before course presentation time. And then students would actively engage in learning and teaching procedure. It is also vital to activate students' subjective initiative, such as through process based assessment. There are always adaptation and adjusting in the learning and teaching procedure, with the learners' situation under consideration.

2. Validity of the Presentation Modes

No presentation manner or style will be always effective for all course points. For example, to present the structure of a tunnel, we need consider it in terms of design, construction, operation and management. It is favorable to present the general features of a tunnel with a video. However, the structure of a planned tunnel will be more vivid with a 3D form. A tunnel building procedure in BIM or practical case recording video would be helpful to student's concept building, since their cognitive processes are inherently visual, and they often interact with knowledge primarily through images.

It is noted that an effective mode is not absolute in terms of knowledge presentation and students' learning procedure. For example, as a phenomena, we can present rockburst a dynamic breaking or failing process, in companion with noise and fragment shooting. In this term, video or a practical case recording is effective way to illustrate a rockburst procedure.

However, the reason and conditions of the rockburst could be complex. Additional information, as well as theory and principle are need to know the mechanism of a practical case. This means knowledge building and capacity development are required in a real and deep learning. And therefore, a concept is often be presented with terms in simple or brief mode at starting. Later, it will be presented with comprehensive terms. Under this situation, it is difficult to present the full meaning with simple words, single picture or photo, even a video of phenomena or procedure recording. There need logical process or thinking in understanding, which is indeed knowledge building and capacity developing. Similarly, same cases, such as tunnel portal structures, it is a description in terms of shapes. Sketch and pictures are more effective than totally in words. However, why different types portal structures are in practical application, we need consider other factors, such as building, operation conditions, regional custom.

In terms of knowledge building, presentation is only the starting point. Teacher could make a high starting level or the knowledge building smooth, but the presentation would not take the place of student's knowledge building by themselves. An effective or favorable situation would be that there are additional routes, such as the routes B and C, as shown in Figure 3, in student's knowledge building and capacity developing. This means student's competence is well qualified or in a higher level in terms of thinking skills and cognitive domains (Figure 1). The more competent of the student's thinking skills, the more effective of the capacity developing in a professional course learning (Figure 2) will be.

It is favorable to apply modern techniques in course presentation. However, we need recognize that new technology could not fully take the place of the traditional form or style of knowledge presentation and knowledge transmission in learning and teaching procedure. Practice in the course presentation indicates the following features.

(1) There is enough information available for course learning at university. However, more than half the students are not skillful in information sampling, especially at the course starting stage. The presentation design would consider this situation.

(2) Of the effectiveness of the various presentation modes, a description concept could be well presented in words plus picture, sketches or videos, such as structure shape or feature showing. A video, such as a case history recording is favorable to show a tunnel building procedure, process phenomena. Where there are various information and learner's thinking involved, such as principles and theories presentation, we need dividing the whole or comprehensive points into a few sub-points to present. In this procedure, it is difficult to present the total meaning with a step. This need students being involved, such as in terms of learners' knowledge building and logical thinking. Under this situation, traditional face to face mode, such as lecturing with the help of blackboard usage, PPT, video showing, as well teacher's body language, would be much effective in the course point presentation and favorable to student's logical thinking being involved.

Conclusion

Conclusions drawn from this study are: (1) students are skillful to obtain course information, but most of them are frequently confused in information sampling, concept and knowledge system developments; (2) course instructors should focus on the presentation of key concepts, the connections of the knowledge points, student's learning skill and capacity development;

(3) adequate evaluation and active motivation are necessary and favorable to student self-enhancement and knowledge building metacognitively.

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Trauma-Informed Leadership: A Case Study of Educational Leadership and Crisis Management of Secondary Schools

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Abstract

This qualitative research utilized a case study research design that investigated the school head's leadership and crisis management. It enlisted the participation of five school heads using convenient sampling based on inclusion criteria. To collect data, a semi-structured written interview based on Lawson (2021) was used. To display the narratives, the data were transcribed, examined, compared, and carefully categorized into several themes by using nVivo software. The findings reveal that school principals employed:1. Varied leadership practices; 2. Modeling leadership behavior; 3. Decision-making and communication; and 4. External support. The findings of this study highlighted the need of applying situational leadership practices to strengthen school heads' instructional and administrative duties, particularly during times of global crises.

Keywords: School Leadership, Trauma-Informed Leadership, School-Based Disaster Risk Management, School Heads, Principals

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Introduction

The rising vulnerability of nations to both natural and man-made hazards endanger people's lives as well as efforts at sustainable development. According to the United Nations Office for Disaster Risk Reduction, 302 hazards caused disasters in 2011 alone that affected 206 million people, claimed about 30,000 lives, and caused damages of an estimated US$366 billion. Children are the most impacted by disasters because schooling systems are disrupted, which affects one of their fundamental rights—the right to education. So far, the Philippines have experienced typhoons, drought, volcanic eruptions, earthquakes, and the pandemic, COVID-19. During the pandemic, there is evidence emerging across the globe of the critical role that leadership plays in steering communities through the challenges we are all facing.

Although crucial, the COVID-19 pandemic is not likely to be the last catastrophe we will see in our lifetime, and school leaders have been asked to guide their communities through uncertain times before. The difficulties faced by school administrators have included anything from aiding communities through economic, social, and emotional ruin to rebuilding after environmental catastrophes. Throughout these challenging times, school administrators have maintained their focus on achieving the best results for their students and school communities while providing clarity and direction, fostering resilience, and instilling optimism.

It might be intimidating to lead in an uncertain world because there are rarely simple answers or well-defined pathways to take. Leaders must quickly adjust to a scenario that is changing drastically in an uncertain environment. They must also use a variety of leadership styles and skills. To provide the best possible teaching and learning environment and outcomes for students, school administrators must manage the urgent while keeping an eye on the long term. When faced with difficulty, some behaviors set effective leaders apart from the rest of the pack. A proactive, inclusive, and open strategy that doesn't minimize information or postpone action is necessary (Kerrissey & Edmonson 2020).

In addition to assisting students and the community in getting back to normal life, education may play a significant role in developing the knowledge, abilities, and attitudes needed to prepare for and cope with catastrophes. The secondary schools that have integrated disaster risk reduction into their curriculum are mapped out in this paper. While capturing major difficulties when disaster risk reduction is less explicitly addressed or where specialized teacher training is lacking, it also covers national experiences. Trauma is embedded into the fabric of a crisis and must be carefully considered as part of a leadership response. The Philippines had a string of super typhoons, earthquakes, and other calamities before and even during the COVID-19 crisis, which had a severe impact on the Bicol region and damaged schools, forced school closures, and put officials in difficult situations as they managed the crisis response.

In accordance with the DepEd Order on School-Based Disaster Preparedness and Response Measures for Tropical Cyclones, Flooding, and Other Weather-Related Disturbances and Calamities, the current study aims to sketch the leadership practices and crisis management of school leaders in a trauma-informed school.

Research Questions

The purpose of this study is to explore the leadership and crisis management practices of secondary school heads. The present study sought to relate the implications of the findings to

the leadership and management practices in trauma-informed schools. achieve the purpose of this study, more specifically, intends to answer the following key questions:

1. How do school leaders describe the process of becoming trauma-informed school leaders?
2. What leadership practices and/or principles do trauma-informed school leaders employ?
3. How did the school leaders' leadership experience in managing the crisis induced by the natural calamities impact their response to other current crises?

Methodology

A.   Methods

The current study is qualitative in nature and adopted the case study research design. School leaders were purposefully selected as the study's primary data sources. A semi-structured interview was utilized to gather data. Study codes were generated, and emerging themes were analyzed using Nvivo software for qualitative data analysis.

B.   Literature Search

To find trustworthy papers and publications for the research, the researcher searched several databases, including Google Scholar, EBSCO Information Services, Science Direct, and websites. Trauma-informed leadership, leadership skills, leadership practices, crisis management, lived experiences, covid – 19, and disaster risk management were the keywords utilized. The databases were restricted to 10 years, from the years 2012 to 2022, however, there were no geographical restrictions. The researcher wanted to discover information regarding the study, thus manual research was done to reduce the number of sources available.

C.   Eligibility Criteria

The researcher searched trustworthy databases including Google Scholar, EBSCO Information Services, and Science Direct to find the publications of interest using the titles and abstracts as a guide. It was promised that from the year 2012 onward, resources would be published in English. The researcher restricts the inclusion of peer-reviewed papers and topic references to achieve that goal.

In terms of exclusions, the researcher specifically omitted studies conducted in languages other than English and unreliable websites like Wikipedia, social media, and unpublished studies and blogs. Additionally, non-peer-reviewed, out-of-date research that was published in 2012 or earlier is not included.

D.   Selections Strategy

The researcher was able to determine the inclusions for the chosen study, as well as its eligibility and discrepancies, and review them. Regarding the full-text evaluation of the eligible research articles, the author skimmed the title and abstract of the chosen articles.

E.   Data Extraction

Using a standardized form, the researcher retrieved the following study characteristics from the eligible articles which include: (i) study characteristics (title, first author's name, journal, year of publication, country of origin, and objective); (ii) methods (research design, sample size, and duration of the study); (iii) subject characteristics (inclusion and exclusion criteria); (iv) results: the key or major findings of the study.

Results and Discussion

A.   Study Selection

The researcher discovered a total of ten relevant research articles and journals on championing trauma-informed leadership, crisis management, and leadership practices from 2012 to the recent year through screening of titles and abstracts from thirty-nine (39) articles collected from the initial search on EBSCO Information Services.

B.   Data Interpretation

Four themes emerged from this study's findings of school leaders' leadership practices during a crisis. It's based on their organization's 1. Varied leadership practices; 2. Modeling leadership behavior; 3. Decision-making and communication; and 4. External support.

Research Question 1: How do school leaders describe the process of becoming trauma-informed school leaders?

The safety of schools is important and every school's disaster risk management team aims at reducing the vulnerability to, and impact of disasters on schools. It prepares both teachers and students for potential disasters, thereby reducing the impact of said disaster. The Philippines is constantly plagued by different natural calamities and has been known to become resilient regardless of the adversities faced by each family. As a major part of the community, schools are strongly affected by each disaster faced by the country, and school leaders serve as front liners in facing issues and challenges brought by the crisis.

School leaders have faced a variety of challenges, ranging from rebuilding after natural catastrophes to assisting communities in the aftermath of economic, social, and emotional turmoil. School leaders have provided clarity and direction, created resilience, and inspired hope while remaining focused on the greatest possible outcomes for their children and school communities during difficult times (Australian Institute for Teaching and School Leadership Limited, 2020). School head 1 highlighted the process of becoming a trauma-informed leader, she tells:

> *"I must move forward. I must be the character during the time of a calamity that people expect to be present during hard times. I must be the leader that people need answers from, and people see as vulnerable too."*

School Head 2 spoke of the importance of positivity and courage:

> *"You know, you must stay positive and courageous. People will look at you as a pillar of courage during tough times. A crisis is an opportunity that let a school leader exhibit courage and boost other people's morale just by setting an example of having a positive and courageous mindset."*

Similarly, School Head 3 described the importance of continuing to move forward through the crisis, and moving forward with empathy and caring for others during that time:

> *"I can always move forward no matter what. You move forward with empathy. You must put people's emotional health before anything else."*

When describing the process of being a trauma-informed leader, School Head 3 stated:

> *"I've been around enough and gone through enough and face different challenges brought by calamities, natural or man-made. But as a leader, you know the crisis will be resolved. You just must hang in there long enough to see it resolve."*

School Head 5 described positivity as the most important skill that a school head must possess to successfully lead through a crisis:

> *"You just got to stay positive and optimistic. I tried to be brutally realistic and positive at the same time. I'm going to call it as I see it, but I'm always looking at the upside of things, and I think that's critical."*

Leaders that are trauma-informed understand that everyone, including themselves, will struggle because of traumatic events, and they react with kindness and empathy. The leaders described the process of becoming trauma-informed leaders by respecting and honoring the values they possess and of the people surrounding them.

Research Question 2: What leadership practices and/or principles do trauma-informed school leaders employ?

School head 2 described a combination of relational and servant leadership that was remembered and continues to be acknowledged by her school,

> *"servant leadership- it was relational, it was participatory, it was empowering. So that's kind of my style and that was appreciated by people during volcanic eruptions or typhoons and even during the pandemic."*

Further, she described the frailty of positional power,

> *"You know how thin positional power is during the best of times and how it just disappears when the pressure is on, and so you know building relationships is the most important thing."*

School head 3 described the way in which she went to each barangay shelter and evacuation center impacted by typhoons or volcanic eruptions. She and her team connected with every child amidst the chaos of the calamities. She further described how she ensured that when school resumed, that student was able to stay with their teachers even though there were initial

recommendations to have students attend alternative schools throughout their district to resume their education.

All 5 school heads created a leadership, or crisis response team, to support the management of the crisis, this is following the DepEd Order 21, s. 2015 (updated DepEd Order 33s.2021) for the school-based disaster risk reduction management team. Teachers form part as members of the team and school heads established roles for different members of the crisis response team. Their practices include meeting monthly to discuss issues and concerns and determine the next steps in the crisis response. There were two specific themes related to the development of leadership that emerged from coding: distributive leadership and traumatization.

Democratic structures are important during a crisis (Smith & Riley, 2012). All five school heads in the study demonstrated distributive leadership to varying degrees, some more apparent than others.

Though School head 1 created a team to support the crisis management process, he described that he would get the support of his team, but he made all the decisions, which isn't something he recommended doing. He believed, *"it's unique to whatever situation you were in and what kind of school you have."* He further explained that *"it helps if you're in that type of situation to be that kind of leader because you get to plan and you don't have as many checkpoints to go."*

School head 2 acknowledged the ways in which members of her team stepped up, assuming more leadership responsibility and they were instrumental in the crisis management response. She stated:

> *"We were able to come in and commit to the team strategically. And so really my leadership style is very participative. I want to surround myself with people more intelligent than me. I want to empower them. I feel my job is to get out in front of them and clear the way and turn them loose. Having like-minded people press in was important. That was the core that really got us through."*

Similarly, school head 3 explained how members of her team meet each other and conduct consultation with the Local Government Unit and other partner agencies such as Bureau of Fire Protection and the Philippine Red Cross. Having clarity was very important for her team. She shared, *"You really couldn't take a day off or things might start to get confusing. You might ask, 'where is he?' And so, we had a lot of collaboration and talked a ton."* She also worked closely with her students, assembling her student council representatives to learn from them. She would, *"bring it back to the team and say, okay, here's what I'm hearing. Here's what they want. How do we make this happen?"* In describing her leadership style, school head 3 explained:

> *"So that was a lot of my leadership is don't put people into a win, lose situation, give people choices, choices that you can live with. So, I always gave students choices and staff choices that I could live with."*

School head 5 described that one of the most important things a leader can do is encourage problems to come forward and be open to the problems and be open to people:

"You want to be available. You want to know the good and bad things to come your way, but then we want to empower people by asking them what's your recommendation. I try to say that all the time- what's the recommendation? What would you do? What should we do? What do you think so that all the time that trains people who work with the leadership team."

She uses this leadership practice as a way of building capacity and empowering his team to develop problem-solving skills. In fact, she used the analogy of weightlifting to explain the importance of doing this as a leader:

"I can go into a weight room and lift all the weights while everyone watches. But it's not helping them get stronger right? Okay, so you want people to be, you know, lifting as much weight around you and building up their capacity as much as possible. And you can do that in subtle and kind of encouraging ways, but what's your recommendation then of course you can empower them by saying, "That's a great idea! Let's do it" Then they're like wow. Then they feel really empowered."

Moreover, the school leaders also mentioned that another practice they do in school is to have the teachers and selected students attend training sponsored by other agencies. The trainings sponsored by different agencies were especially for disaster preparedness and prevention.

Research Question 3: How did the school leaders' leadership experience in managing the crisis induced by the natural calamities impact their response to other current crises?

Once the school heads began to make sense of the situation, they began to engage in prioritizing the issues and responses needed. School head 4 described how her leadership experience in managing crises induced by natural calamities impacted her response to another current crisis:

"The COVID-19 pandemic was more challenging than another crisis we faced. We were put in a serious dilemma how to figure out how to further serve our students. However, like our practice when we face natural calamities, we nailed down all the variables that you have control over so that you know for sure you identify the variables that are out there that you don't know. You get input and you know to make your best guess. This is one of the beautiful parts I think when we experience a crisis, we start brainstorming priorities, disasters really focus you down on what matters. You know we talk in education all the time about the importance of goal setting. And this is like where the rubber hits the road. It's no longer academic or theoretical. There's no way we can address all those priorities, so let's put them in order and start at the top and see how many of them we can address."

School head 2 routinely used a whiteboard and mapped out the pros and cons for each situation. Her barometer for prioritizing was considering what was best for students. After making sense of a critical situation and prioritizing the needs, the skill of decision-making involves the implementation of necessary responses. The decision-making process involves economic, political, ethical, and safety considerations. These decisions often need to be made under stressful conditions with limited information and time to make them. School head 2 indicated that decisions were made by her. She recalled:

> *"The board said you don't have to come to us for any decisions, so literally, I carried the school on my shoulders. That's what I did. And to be honest with you, it helps if you're in that situation to be that kind of leader, because you can plan, and you don't have as many checkpoints to go to."*

School head 3 emphasized:

> *"You make your decision on what you feel is at times going to do the least amount of harm. And then it's at other times on what's best for everybody. Sometimes you just must make decisions and go with them. Moving forward with empathy and being part of the community. Even when you make the hard decisions, they can hear those hard decisions and have faith in you."*

School head 5 acknowledged the need to engage in repeated questioning to help facilitate the decision-making process:

> *"You're not going to find a perfect situation like you just must make the best decisions now. And you must keep saying to yourself what next? What do we need to do next?"*

Further, school head 5 described the challenges inherent in the decision-making process because *"You don't have all the information you want. You don't have all the time you want. Typically, in schools, we have plenty of time."*

Communication is a critical aspect of crisis management with a specific need for information to flow smoothly within an organization as well as between organizations involved in the coordinated response. As part of their crisis management response, each of the five school heads within this study spoke of the importance and challenges of communication.

School head 2 described the surreal scene when the volcano erupted when the sky turned black and ashes filled the air, barely allowing her to breathe. Since their school is near the vicinity of the volcano, communication became a challenge especially during this disaster because power lines are out, and mobile connection is out too.

Similarly, school head 4 described how rescues were coming narrowly escaping harm and arriving safely at the evacuation center. Parents were unable to contact their children and rushed to school or the evacuation centers.

School head 1 described the need to set up messaging protocols to communicate with staff and families. He emailed staff each day to inform them what was happening for the day. As part of this, he routinely sent pictures to teachers so that they could see first-hand what things looked like. This helped him make sure that "everybody was in the loop of communication about what was going on." Subsequently, he provided families with FAQs each day.

School head 2 described the challenges with communicating when information was changing:

> *"Communication was probably the toughest part because people want to know, and you want to give them information, but the information is changing constantly. It's very frustrating. It's hard enough to reach people. You try every form you have. And again, you don't know where people are so communication is tough."*

Both School heads 1, 2, and 3 described town hall meetings that they held for their communities and/or staff. School heads use their gymnasium to hold the conference and use it as a platform to communicate with the staff and the parents. Other stakeholders are invited too, this serves as an avenue to relay important details on crisis management and/or to orient people on their roles in crisis management.

Another theme that emerged through the analysis of the data was the theme of external systems of support. External networks of support are part of crisis management efforts and responses, providing opportunities for consultation, negotiation, and coordination. In fact, "Crisis operations are multi-organizational, trans-jurisdictional, polycentric response networks. They demand lateral coordination, not top-down command, and control" (Boin & t' Hart, 2003, p. 547). All five school heads described coordinated efforts with public and private organizations as part of their crisis response with varying experiences both positive and negative.

School head 5 emphasized that relationships were instrumental in helping them navigate the crisis. The LGU offered their support to her school, sharing resources and information, including email lists of important resources in the community. Training for staff was also provided for crisis response and management.

School head 1 acknowledged the challenges with coordinating multiple agencies:

> *"You have different state agencies and you're trying to put them all together with questions and answers because they don't talk to each other and how the food chain goes up and the food chain comes back down to you. It was an immense situation that took a while to get through the process."*

She also described how she communicated directly with the Department of Education when she became frustrated with agencies that she felt were not getting things done in a timely manner, so "she just jumped on that and things happened at the provincial level because like I mentioned going up the food chain, then coming back." School head 3 recalled objecting to local officials and asking them to refrain from communicating messages to her families and undermining her response plan:

> *"I talked to all the other school heads in the area, and they said what do you need? I said I need classrooms with my teachers. I don't need kids spread out. They need to be with their teachers and their friends. Other schools provided classrooms so we can continue our classes."*

Conclusions and Recommendations

Utilizing the potential and skills of stakeholders to turn crisis roadblocks into development opportunities is the organizational duty of the school head. They oversee raising production and efficiency of the organization, especially responses in crisis management. They owe it to their stakeholders and the rest of society to set an example of moral behavior and inspire others to do the same. They must encourage virtues and moral conduct despite the health and education challenges to maintain organizational integrity. Finally, it is the professional and operational accountability of school leaders to shape the learning environment for everyone's safety while allowing teachers to perform their duties. When a crisis strikes, they oversee planning support services to help with problem-solving as well as facilitating access to different resources, linkages, and technology.

Based on the findings of the study, it is recommended that future researchers identify factors that impact the coordination of external networks and their ability to collaborate and develop a cohesive crisis management response within a school system. It is also recommended to investigate the characteristics of effective crisis management teams within school settings. Since the researcher conveniently chose the school heads for the current study, it is advised to perform additional case studies and increase the diversity of the participants. Because the conclusions reached from a multiple case study may be more important than those from a single case study and because the findings may support theoretical representation, doing a multiple case study can also have analytical advantages (Yin, 2017).

APPENDIX A
TRAUMA-INFORMED LEADERSHIP QUESTIONNAIRE
Adopted from Lawson (2021)

Part I. Open – ended questions.

1.   Please tell me why being trauma-informed is important as a leader?

2.   Can you describe any personal and/or professional experiences you feel influenced your commitment or preparedness as a trauma-informed leader?

3.   What is your definition of trauma-informed school approach? Has it changed? And if so, how?

4.   Tell me about the knowledge, skills, dispositions you have found important to creating a trauma-informed environment.

5.   Have you deal with resistance with trauma-informed practices and if so, how have you chosen to deal with those?

6.   To what degree have trauma-informed approach supported the needs of your staff and students?

7.   Tell me about the process you and your staff went through to become a trauma-informed school?

8.   Can you describe any challenges you may have encountered in becoming a trauma-informed school?

9.   What evidence of change have you seen since becoming a trauma-informed school?

10.   Based on your experience, how might other school leaders be better prepared to lead and develop a trauma-informed school environment.

PART II. Please consider your knowledge, experiences, and practices related to your role as school principal in a trauma-informed school as you complete the following survey questions.

Questions	Minimal Knowledge	Below Average Knowledge	Average Knowledge	Above Average Knowledge	Extensive Knowledge
What is your level of knowledge related to trauma-informed practices?					
What level of professional development have you received to support teachers and stakeholders in trauma-informed best practices?					
Statements	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly agree
I am prepared to be an instructional leader for trauma-informed best practices in school.					
Faculty and staff participate in on-going professional development and collaboration related to a trauma-informed school.					
The COVID – 19 pandemic, natural calamities such as typhoons, volcanic eruptions, earthquakes and others influence my understanding of creating and sustaining					

a trauma-informed environment.					
The COVID – 19 pandemic, natural calamities such as typhoons, volcanic eruptions, earthquakes, and others has influenced my commitment to creating and sustaining a trauma-informed school environment.					

Part III. Open – ended questions

1.   What type of professional development do you receive to support teachers and stakeholders in trauma-informed best practices?

2.   How do you ensure staff members are held accountable for implementation of trauma-informed best practices within school?

3.   How has the natural calamities and the COVID – 19 pandemic affected your vision for a trauma-informed school environment?

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The Development of a Digital Entrepreneurship Children Education Model in Malaysia

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Abstract
In the context of business and entrepreneurship, attitudes, digital skills, and the teaching of entrepreneurial values by preschool teachers are very important in engaging children. The purpose of this study is to analyse the needs in developing a model for Digital Entrepreneurship Education for B40 group kindergarten children based on teachers' perceptions. The respondents of this study consisted of 367 kindergarten teachers across Malaysia. This research method was conducted quantitatively using a questionnaire. The collected data were analysed using Statistical Package Social Science (SPSS) version 21 software, considering the mean. The findings of the study revealed that teachers' perceptions of building the Digital Entrepreneurship Education Model for B40 Group Kindergarten Children under the aspect of "Children understand the benefits of saving money" had the highest mean of 3.93. While teachers' perception of "Digital skills should be introduced to children (21st century learning)" recorded the second highest mean with a mean of 3.86, followed by the statement "Children understand the concept of the value of money" with a mean of 3.83.

Keywords: Digital Entrepreneurship, Children Education, Model Entrepreneur

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Introduction

Entrepreneurship education must be taken seriously today and is an important component in creating a creative and innovative Malaysian society. Businesses and entrepreneurship are the backbone of the country's economy. In the technological age of the 21st century, the National Entrepreneurship Policy (DKN 2030) should adapt the elements of digital entrepreneurship education to the needs of B40 children through the comprehensive National Preschool Standard-Based Curriculum. Various plans and policies implemented before the Covid 19 pandemic, including the National Financial Literacy Strategy (2019-2023) and the Shared Prosperity Vision 2030 agenda, which aims to balance living standards and community development (Financial Education Network, 2019; Ministry of Economic Affairs, 2019), had to be refined for the educational requirements of the new norm. However, the adequacy of educational development based on children's survival needs (life survival) in the form of entrepreneurial education is less emphasized. To ensure sustainable economic and technological development, as embodied in the National Transformation 2050, individuals' knowledge of financial management must be digitally applied at an early stage, through knowledge related to financial literacy, basic entrepreneurial skills, and a high-trust attitude as a person.

What the future holds for children is difficult to predict if the Covid-19 pandemic continues to plague our country. Therefore, a specific action plan for the development of children's cognitive, affective, and psychomotor development must be observed by all stakeholders to balance the educational needs in this new norm. The National Strategy for Financial Literacy (2019-2023), which was implemented before the pandemic, has provided educators, parents, and stakeholders with some useful guidance on how to intensify financial literacy among Malaysians. This programmed is a comprehensive action plan to raise individuals' awareness of financial literacy (Financial Education Network, 2019). For children who are money literate, they will be provided with the knowledge, skills, attitudes, and habits needed to make smarter financial decisions.

Literature Review

In the National Preschool Standard-Based Curriculum, there is one of the 6 main pillars, namely the Science and Technology Pillar which aims to teach financial literacy (Ministry of Education Malaysia, 2017). This pillar also complements one of the science disciplines, namely Early Mathematics, and the Standard Content on the value of money is also emphasized in children's learning. One of the activities is to teach financial basics to children to familiarize and educate them on how to handle money and daily expenses. However, today's education must be geared towards promoting future careers. Education related to the fundamentals of early childhood entrepreneurship is particularly responsive to these needs, as it targets social engagement and focuses more on children's specific skills (Sarikaya & Coskun, 2015).

Appropriate teaching methods for financial literacy should be integrated into the education system so that children are more skilled and efficient in financial management matters in the future (Mohamad Fazli & Nurhayatul, 2018). Basic elements of entrepreneurship that can be emphasised should include, at the child level, financial literacy, saving and budgeting, willingness to face unexpected events, introduction to money, the need and desire for shared savings (Financial Capability and Inclusion Demand Side Survey, 2018). The study by Batty, Collins, and Odders-White (2015) shows that the financial education programmed for poor families, targeting the primary school level, has a positive effect of helping children improve

their knowledge. Respondents are exposed to instructions and educational programmed on finance that enable them to make prudent and better financial decisions.

According to Abdul Halim and April Ann (2016), the birth of a small entrepreneur should be a useful activity based on real experiences. In the government's efforts through the Education Development Plan (Ministry of Education Malaysia, 2018) and the Shared Prosperity Vision 2030 (Ministry of Economic Affairs, 2019), which emphasises the aspect of further preparing for a prosperous life in the future, the early generation of children are among the most important practitioners who will be prepared for the increasingly challenging world of work. Competence in managing finances is one of the most important components for children to ensure they become smart financial managers when they grow up (Inanna et al. 2020; Nurul 'Alyaa Adilla, 2015).

A study on the appropriate model for early childhood financial education in Malaysia found that the focus is less on preschool education than on secondary education. According to Cheng, et al. (2020), basic entrepreneurship education initiatives should be introduced to all individuals from an early age. The fundamental importance of entrepreneurship should begin and develop in children between the ages of four and seven (Cheng, et al. 2020). At this age, they should already know the basics of managing money and how to manage finances through business. If an individual understands the risks associated with managing finances at a young age, they should be able to make better financial decisions in the future (Inanna et al. 2020). Jufri and Wirawan (2018) noted that what kindergarten children learn about the fundamentals of entrepreneurship will have an impact on their knowledge, values, behaviors, and practices when they are adults. However, according to them, children lack knowledge and practice about basic entrepreneurial programmed that are individualized and have a playful element.

Therefore, a new medium in forming a basic model of entrepreneurship in digital form for kindergarten children is very important for the purpose of devising best practices and implementing appropriate improvements. The objective of this study is to analysing the Need for the Development of a Digital Entrepreneurship Education Model for B40 Group Kindergarten Children based on the teacher's perception.

Research Method and Data Analysis

This research method was carried out quantitatively. This study was conducted to analyse the Need for the Development of a Digital Entrepreneurship Education Model for B40 Group Kindergarten Children based on teachers' perceptions. This questionnaire was distributed to 367 kindergarten teachers.

A total of 367 questionnaires were distributed to kindergarten teachers. The data obtained were analysed using the Statistical Package for Social Sciences (SPSS) version 21. Assessment for frequency (f), percent (%), and mean for the analysis of each item.

1.   The Need for the Development of a Digital Entrepreneurship Education for B40 Kindergarten Children

The data analysis in Figure 1 shows the analysis of the need for the development of a digital entrepreneurship education model for B40 kindergarten children. The data analysis shows that for the statement "Children understand the benefits of saving", many teachers agree 227

(61.9%), strongly agree 69 (18.8%), not sure 49 (13.4%), followed by disagree 19 (5.2%) and strongly disagree 3 (0.8%) by recording the highest mean of 3.93.
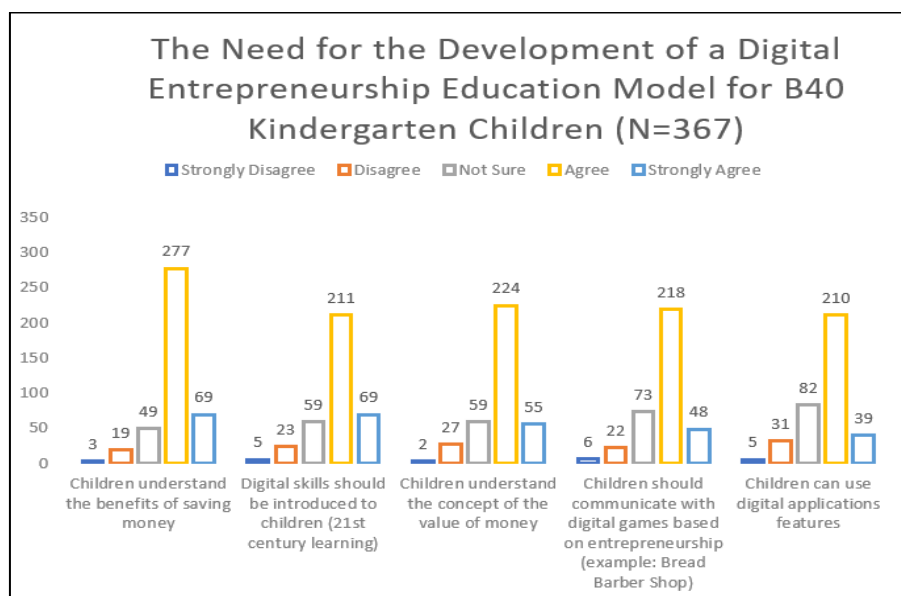
Figure 1: The Need for the Development of a Digital Entrepreneurship Education Model for B40 Kindergarten Children (N=367)

"Digital skills should be introduced to children (21st century learning)" recorded the second highest mean with a mean of 3.86. It was found that 211 (57.5%) of teachers agree, 69 (18.8%) strongly agree, 59 (16.1%) not sure, 23 (6.3%) disagree, and 5 (1.4%) strongly disagree. For the statement "Children understand the concept of the value of money", 224 (61%) of teachers agree, 59 (16.1%) not sure, 55 (15.0%) strongly agree, 27 (7.4%) disagree, and only 2 (0.5%) strongly disagree with the mean 3.83.

For the statement "Children should communicate with digital games based on entrepreneurship (example: Bread Barber Shop), it was found that many teachers agree 218 (59.4%), 73 (19.9%) unsure, 48 (13.1%) strongly agree, 22 (6.0%) disagree, and 6 (1.6%) strongly disagree with a mean of 3.76 "Children can use digital application features" recorded a mean of 3.67. It was found that 219 (57.2%) agree, 82 (22.3%) not sure, 39 (10.6%) strongly agree, 31 (8.4%) disagree, and only 5 (1.4%) strongly disagree.

2. Content Requirements of the Digital Entrepreneurship Education Model for B40 Kindergarten Children

Figure 2 content requirements of the digital entrepreneurship education model for B40 kindergarten children. The foundation of honesty in digital entrepreneurship recorded the highest mean of 3.81, with teacher responses of 224 (61%) agree, 48 (13.1%) strongly agree, 77 (21%) not sure, followed by 13 (3.5%) disagree, and the rest 5 (1.4%) strongly disagree "Using various resources to produce digital entrepreneurial products" recorded the second highest mean of 3.78 as many as 218 (59.4%) of teachers agree, 48 (13.1%) strongly agree, 78 (21.3%) not sure, 18 (4.9%) disagree and the rest 5 (1.4%) strongly disagree.
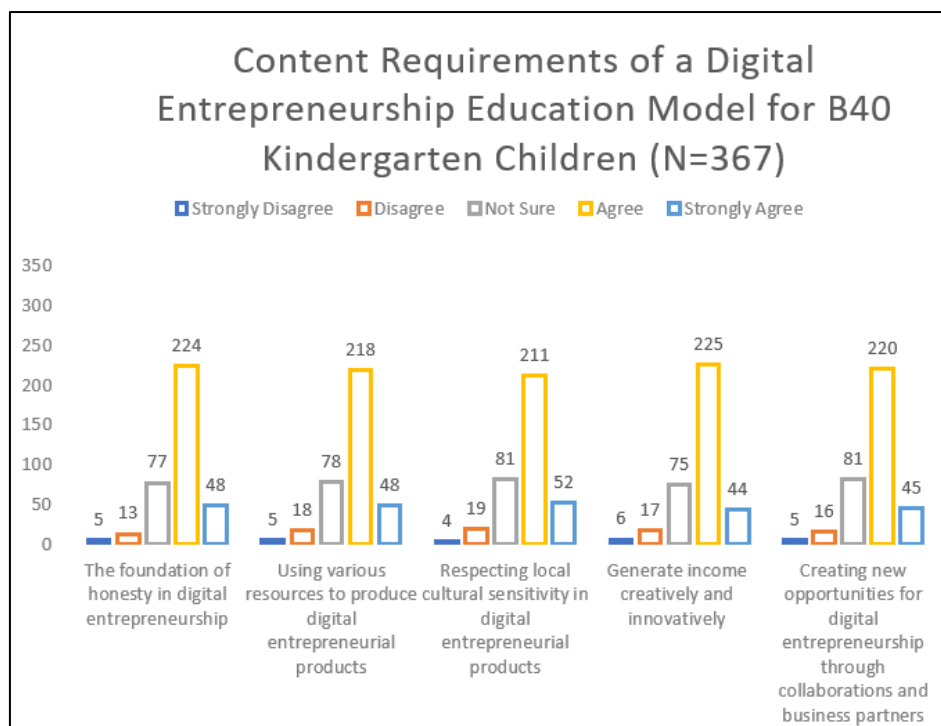
Figure 2: Content Requirements of the Digital Entrepreneurship Education Model for B40 Kindergarten Children (N=367)

Respecting local cultural sensitivity in digital entrepreneurial products yielded a mean score of 3.78, with 211 (57.5%) agree, 81 (22.1%) not sure, 52 (14.2%) strongly agree and the remainder 18 (5.2%) disagree and 54(1.1%) strongly disagree. Next, generating income creatively and innovatively recorded a mean score of 3.77, with 225 (61.3%) agree, followed by 75 (20.4%) not sure, 44 (12.0%) strongly agree, 17 (4.6%) disagree and 6 (1.6%) strongly disagree. Creating new opportunities for digital entrepreneurship through collaborations and business partners also received a mean score of 3.77, with 220 (59.9%) agree, 81 (22.1%) not sure, 45 (12.3%) strongly agree, only 16 (4.4%) disagree and 5 (1.4%) strongly disagree.

The findings of the study as a whole show that the analysis of the need for the development of a digital entrepreneurship education model for B40 kindergarten children under the aspect of "Children understand the benefits of saving money" many teachers agree (61.9%), strongly agree (18.8%) with the highest mean of 3.93. This result is like that of Abdul Halim and April Ann (2016), who found that parents talk to their children about how to save money by saving part of their daily allowance and associate saving with things they want to buy this will encourage them to save.

This study is also like the study by Nurul 'Alyaa Adillah (2015) that teaching children prudent financial management from childhood can reduce financial problems, including bankruptcies, in the future. Competence in managing finances is one of the most important components for children to ensure they become wise financial managers when they grow up.

The response "Digital skills should be introduced to children (21st century learning)" recorded the second highest mean with a mean of 3.79, which is in line with Dayang Tiawa (2006) study showing that using multimedia with children can make them communicate or interact more effectively. Moreover, teaching methods that incorporate multimedia elements such as these will further increase children's interest in learning and, more importantly, ensure that these

children can more easily absorb and understand everything they are taught. In relation to digital games, research has found that a student learns a concept using digital games without being aware of it. Similarly, research by Smaldino et al. (2005) and this digital game stimulates players' thinking to apply the learned skills. According to the study of Abdul Halim (2007), 72.4% of children have a computer at home. 41.4% of children who have a computer at home were introduced to computers by their parents when they were four years old. So, this study is suitable for today's children who already know a little bit about how to use today's technology.

For the teacher feedback "Children can communicate with digital games based on entrepreneurship (example: Bread Barber Shop), it was found that the majority of teachers agree (59.4%) and recorded a mean of 3.76. This is consistent with the study on Digital Game Based Learning (PBPD), a dynamic learning process that combines game elements and student motivation (Chung & Chang, 2017; Putra & Iqbal, 2016). Previous studies have shown that PBPD can effectively increase student motivation and achievement (Alsawaier, 2019; Lizawati et al., 2017; Tangkui & Tan, 2020). The use of PBPD in learning is appropriate for all levels, whether primary school, secondary, or higher. How PBPD is integrated into learning is important (Muhamad et al., 2015). Students' active participation in games in addition to interacting with friends can help them build their own ideas and knowledge.

Conclusions

This study makes a significant contribution to the elements of entrepreneurship, especially the need to develop of a Digital Entrepreneurship Education Model for Kindergarten Children of the B40 group based on teachers' perceptions. This is because the study of entrepreneurship in kindergarten is still not carried out much. This study also provides evidence and explanation for the need to develop a model of digital entrepreneurship education for B40 children in kindergarten. It also helps to increase the importance of entrepreneurial knowledge for students' readiness to apply entrepreneurial elements.

Therefore, a new medium in forming a basic model of entrepreneurship in digital form for kindergarten children is very important for the purpose of devising best practices and implementing appropriate improvements. Disclosure of the B40 group's entrepreneurial fundamentals is closely related to financial information and can have a positive impact on long-term practices (Syahrin et al. 2020). This national-level strategy also supports research collaboration and guides policy-making initiatives in the future to increase public awareness of the importance of financial literacy (Financial Education Network, 2019). In addition, this programme can help parents, the community, and related parties by receiving benefits based on the idea of National Transformation 2050 in shaping the well-being of children through a balanced Malaysian economy.

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Proposing a Trauma-Informed Curriculum Framework for Basic Science in Medical Education – A Comprehensive Exploration

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Abstract

This study addresses the impact of psychological trauma on medical students and investigates interventions to support academic success. Observations at a Caribbean medical school revealed students facing trauma-related difficulties, prompting an inquiry into the inadequacies of current educational strategies and the need for trauma-informed medical education. The study hypothesizes that a dedicated and inclusive curriculum can empower students with traumatic experiences to excel in medical education. The overarching question probes the ways past trauma affects education, while secondary questions delve into defining psychological trauma, its impact on academic achievement, and strategies for trauma-informed learning environments. The literature review identifies gaps in curricular frameworks and outcome measurement, highlighting disparities in disease representation, the impact of cultural biases in medical education materials, and the importance of fostering self-regulation skills in students. The research employs an interdisciplinary approach, combining a systematic literature review with qualitative analysis through interviews with traumatized students. Six key findings emerge, emphasizing the significance of creating safe environments, informing educators about trauma, avoiding cultural biases in examinations, and developing self-regulation skills. The proposed Trauma-Informed Curriculum Framework aims to address gaps in medical education by integrating evidence-based interventions. Ethical considerations prioritize participant confidentiality and informed consent. The envisioned framework seeks to contribute globally to trauma-informed medical education, fostering inclusivity and support for students with psychological trauma histories. This research lays the foundation for a transformative curricular framework in medical education.

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Introduction

Since 2000, the researchers of this study taught pathology at a US medical school in the Caribbean. During this period, it has been observed that students often fail classes, depart from school, or exhibit "unprofessional" behavior due to personal or family concerns or trauma. As a professor and administrator, the researcher has learned that the difficulties are related to personal psychological trauma, such as childhood abuse, war memories, early pregnancies, diseases or racial prejudice, and the burden of caring for disabled family members or parents with chronic illnesses. At enrollment, these students often don't mention these past traumatic events or family issues. Unfortunately, the demanding curriculum of a medical school often reveals these students' hidden sensitivity and they become stressed. When dealing with these students, universities usually provide counseling, contact emergency medical services if appropriate, or suggest they withdraw from the program for further counseling before continuing. These approaches rarely solved their education challenges. As educators, we regularly encounter students facing academic challenges, but do we understand the reasons behind their struggles, particularly when linked to past adversities or post-traumatic stress syndrome, and are our interventions, infrastructure, and the recognition of these concerns by teachers and admins adequately addressing the diverse needs of these students, and how should we tailor our teaching approaches to effectively support them? These youngsters should not drop out of school despite what has occurred to them. These traumatic experiences have emotional, psychological, neurological, and bodily consequences (Gabor, 2021).

According to data, there is often at least one traumatized youngster in every classroom (K-12). Nearly 40% of American students have experienced some kind of traumatic stressor in their lives, with sexual assault, physical assault, and witnessing domestic violence being the three most common. This information is based on data from the National Child Traumatic Stress Network (Copeland et. al., 2007). Evidence implies that these past traumatic experiences have significant emotional, psychological, neurological, and physical ramifications (Gabor, 2021). While trauma-informed class policy exists and is being practiced in several K-12 schools, trauma-informed curriculum is essentially non-existent in higher education or professional institutions. According to the literature, trauma-informed medical education, or TIME (Brown et al., 2021; Chokshi et al., 2020; Ghazala, 2022; Thomas et al., 2019) is a relatively new educational strategy that focuses on teaching methods, school environments, and teacher training that promotes awareness of students and trainees who experience psychological trauma due to various determinants. The trauma-informed approach, or TIME, is driven by four tenets referred to as the "4 R's." Understanding trauma and how it can affect individuals and groups, recognizing the signs of trauma, having a system that can respond to trauma, and resisting re-traumatization are all components of trauma awareness. A modification of the trauma-informed medical education strategy offers a framework to address and mitigate these consequences and promote the safety and health of patients and medical students in clinical settings. Six principles guide trauma-informed care (TIC). TIC makes decisions that establish trust and provide mutual support to aid healing and rehabilitation. TIC seeks to eliminate power inequities and recognize everyone's participation in rehabilitation and care. TIC promotes recognizing and treating historical trauma, overt prejudice, and latent biases. Norah Sweetman (2022) examines the components of the term "trauma-informed classroom", another analogous approach that promotes a similar concept. This 'trauma-informed classroom' aims to help teachers understand their students' daily lives and recognize trauma-based emotions and behaviors. Classroom activities and teaching approaches can be changed to meet their requirements in conversation with students and via continual feedback. A team must support the teacher and acquire needed services. Therefore, educators advocate for establishing policies and practices that support

learners to prevent further re-traumatization of traumatic experiences (McClinton, 2020; Cohen et al., 2017). When viewed from a different perspective, psychological trauma is also a public health concern that could negatively impact society. The detrimental impacts of living in extreme poverty, neglect, abuse, and addiction on children and their families have been the subject of numerous studies, with prominent institutions reaching a consensus (Radford et al., 2013). Nadine Burke (Burke, 2014) examines the transition from categorizing problem issues as requiring a "social service" or "medical" response to recognizing the chronic levels of trauma experienced by highly neglected groups. Even though there are multiple nomenclatures for the trauma-informed educational approach, the fact remains that these approaches do not highlight specific essential components of this educational strategy. All these approaches do not elaborate on how to assess the academic needs of these students, what kind of pedagogy should be used, the requirements for the infrastructure, how to deliver specific training to teachers, and how the outcome of these interventions should be measured in non-clinical settings in medical education.

The primary hypothesis of the study postulates that individuals facing unfavorable psychological events may encounter disruptions in their pursuit of education, leading to potential discontinuation. It further suggests that these students, when provided with a dedicated and inclusive curriculum, have the potential for academic excellence. The overarching research question centers on understanding how past psychological trauma influences students' education and performance. Additionally, the inquiry seeks to identify effective strategies for addressing the impact of psychological trauma on education.

The secondary research questions are as follows:

Definition of "Psychological Trauma": This question aims to investigate and establish a clear definition of psychological trauma, providing a foundational understanding for the subsequent exploration of its effects on education.

Negative Effects of Psychological Trauma on Academic Achievement and Professionalism: This question delves into the exploration of how psychological trauma negatively affects students' academic achievement and professionalism, shedding light on the multifaceted impact of trauma on various aspects of a student's educational journey.

Development of Strategies for Trauma-Informed Learning Environments: The focus here is on identifying evidence-based strategies that can be implemented to create trauma-informed learning environments. This question addresses the proactive measures that can be taken to support students with psychological trauma in an educational setting.

Roles of Medical Educators and Academic Leaders: This question investigates the roles played by medical educators and academic leaders in the context of addressing the impact of psychological trauma on students. Understanding their roles is crucial for the effective implementation of strategies and the creation of supportive educational environments.

By addressing these research questions, the study aims to contribute valuable insights into the intricate relationship between psychological trauma and education, paving the way for the development of informed and targeted interventions within medical education settings.

Methodology

The researchers attempted to find answers to these research questions and finally to the aims of this study by conducting, a) An interdisciplinary systematic literature review and a follow-up and b) a qualitative investigation of the academic requirements perceived by students who reported having experienced such trauma in their lives. This second part of the research will be qualitative in nature and is scheduled for the next year.

Literature Search

A systematic literature review for the evidence of the definition of trauma was conducted. The review explored why a trauma-informed approach (Thomas et al., 2019) is necessary for medical education in the current geopolitical context. Key search terms were defined using the PICOS approach (Methley, et al., 2014) (Table 1).

Domain	Search term
P – Population (Descriptions of the group of the population of interest)	Medical students who reported experiences phycological trauma.
I – Intervention (What are the main interventions to consider?)	Available effective policies or guidelines on the trauma-informed education or care.
C – Comparison (Is there an alternative policy to compare)?	Comparison of existing protocols and policies across different educational systems, public health and general care system in various countries.
O – Outcomes measures	If these existing protocols and policies are effective in improving outcome of the students' academic performance or attitude toward self-care.
S - Study design	Any study design, excluding case studies and personal communications.

Table 1: Key search terms were defined using the PICOS approach.

Appropriate articles were collected after searching various databases that included Business Sources Complete (EBSCO), Medline/CINAHL-health topics, PsycInfo, ProQuest Cochrane Library, PubMed, Google Scholar, and Discover Aid. were searched with the keywords. Search results were imported into Mendeley Desktop software and duplicates will be removed. Titles and abstracts were assessed against the inclusion and exclusion criteria. Full texts of all eligible studies will be reviewed against the criteria, with reasons for exclusion reported. We searched for evidence specifically about trauma-informed school instructors, the definition of psychological trauma, established classroom policies, and materials relating to their skills, roles, or training. A flow chart of the search strategy is shown in Appendix A.b).

Conclusions

Key Findings

The study's Key findings underscore the significant impact of various diversities, encompassing historical, racial, and disease-related factors, on students' pursuit of academic and professional goals. Recognizing the multifaceted nature of these challenges, the following key recommendations emerge to address and overcome barriers within educational settings.

These recommendations not only aim to create an inclusive learning environment but also advocate for a holistic approach that considers students' psychological well-being, cultural awareness, and collaborative capacities. The six key findings and corresponding strategies are outlined below:

1.   Creating a Safe School and Classroom Environment

Results of the literature review showed that a safe classroom environment is paramount for fostering optimal learning experiences. It serves as the bedrock for students' emotional well-being, creating a space where they feel secure, supported, and free to express themselves. In a safe setting, educators are attuned to signs of distress, allowing them to proactively connect with students facing challenges (Todd, 2021). By redirecting behavior through private discussions and offering reasonable choices, educators empower students to regain control in a supportive manner. Post-crisis, calm discussions about the incident help strengthen relationships, fostering understanding and trust. This comprehensive approach not only enhances academic performance but also cultivates a positive culture of learning, promoting holistic development beyond mere achievement.

In a classroom, fostering a positive and inclusive environment is crucial, and teachers should be mindful of their language to create a supportive atmosphere (Peterson, 2023). Here are some inappropriate words and phrases to be avoided:

i.   Yelling or Overly Stern Voice: Using a loud or stern voice can trigger trauma responses and create a negative emotional impact on students.
ii.   Triggering Language: Avoid using words that may trigger negative emotions or distress in students, as this can hinder their ability to engage and learn.
iii.   Judgmental Phrases: Refrain from using judgmental phrases such as "Really?" "Are you sure?," or "Are you serious? " as they may make students feel invalidated or defensive.
iv.   Negative Labels: Steer clear of using labels like manipulative, lazy, resistant, or unmotivated, as these can contribute to a negative perception and hinder positive behavior.
v.   Time-Frame Accusations: Avoid making statements like "You've been acting like this for a while now," as it may not address the root cause and can be counterproductive.
vi.   Disrespectful Labels: Refrain from labeling students as disrespectful or attention-seeking, as this can perpetuate negative stereotypes and hinder a supportive teacher-student relationship.

Promoting positive communication involves choosing words that uplift and encourage, fostering an environment where students feel respected, valued, and understood. Using constructive language helps create a conducive learning space where students are motivated and eager to engage in the educational process.

2.   Inform Teachers About Psychological Trauma and How It Can Affect Students

Several educators inquire about identifying signs of trauma in students and understanding its manifestations in the classroom. It is crucial to acknowledge that trauma varies significantly from person to person, encompassing diverse experiences, emotional consequences, manifestations, and requirements for recovery (Garay *et al.*, 2022). Due to the inherent need for survival, when a student encounters a traumatic incident that poses a perceived threat to their existence, their brain, and body promptly and forcefully respond to prevent injury by

focusing their energies on self-preservation. This induces a condition of anxiety and stress in the student. Their brain exhibits hyper-focus on the danger, rendering it incapable of diverting attention to any other matter until the threat has subsided. Training programs should focus on identifying signs of trauma. The results showed that recognizing signs of trauma in the classroom includes observing extreme shyness, disproportionate reactions to setbacks, difficulty managing strong emotions, clinginess, challenges in transitioning between activities, forgetfulness, frequent complaints of feeling sick, difficulty focusing, lack of safety awareness, missed deadlines, poor academic performance, apathy, perfectionist tendencies, and physical or verbal aggression among students.

3. *Avoid Cultural Stereotypes and Biases in the Examination Questions*

Text of multiple-choice questions: The results showed that in most MCQs, there is no relevance to why race/ethnicity is used- particularly White/Caucasian. The result of my research shows that in most commercially available question banks (MCQ), descriptive mentions provide additional context but are not key to answering the question, while central mentions contain information crucial for answering the question. For example, in the cases (question texts) where the White/Caucasian patients are mentioned, 92.6% of these mentions are descriptive, offering supplementary information, while 7.4% are central, and directly relevant to the case's question. This distinction is consistent across racial/ethnic categories, emphasizing the importance of recognizing when race/ethnicity information is supplementary versus essential in medical cases. The combined dataset reflects the nuanced utilization of race/ethnicity information, where the majority of mentions are descriptive, contributing context but not integral to answering the posed questions. It is therefore important to address the imbalance in mentioning White/Caucasian populations, which make up about 90% of questions, which may contribute to normative biases and overlook the diverse demographic landscape of the United States.

The research reveals noteworthy trends in disease mentions across diverse racial/ethnic groups, highlighting disparities in disease representation. For White/Caucasian individuals, coronary artery disease (CAD), cystic fibrosis, and hypertension are the most common diseases mentioned in the question stem in MCQ banks. In contrast, African American individuals exhibit a higher prevalence of sickle cell disease, sarcoidosis, and G6PD deficiency, with hypertension as a notable mention. Asian individuals commonly face hypertension and inflammatory bowel disease, with gallstones as a notable mention. Hispanic individuals frequently encounter inflammatory bowel disease, and osteoporosis is a notable mention. Native American individuals are notable for osteoporosis and vasculitis. These statistics underscore the disparities in disease representation, with some diseases appearing more frequently in certain racial/ethnic groups. The challenge lies in avoiding the perpetuation of stereotypes and recognizing the multifactorial nature of disease prevalence. Incorporating this nuanced understanding into medical education is crucial for cultivating culturally competent healthcare professionals.

4. *Avoiding Cultural Stereotypes and Biases in the Medical Textbooks*

Medical textbooks: It has been shown that dermatology texts significantly overrepresent light skin tones and underrepresent dark skin tones (brown and black)- Appendix B. Even though advances in technology have lessened the difficulties associated with shooting people with dark skin tones, discrepancies still exist. According to a 2020 study, up to 18% of the photographs in dermatology textbooks feature people with dark skin tones, mirroring the percentages observed in 2006 (Bandyopadhyay, et. al., 2022; Kaundinya, 2021). Whites' focus and

definition of white as normal when describing skin conditions is the fundamental cause of the underrepresentation of people with brown and black skin. Dark skin tones are more commonly employed to depict STDs than common diagnoses like acne, making the stratification of skin tone portrayal based on disease more worrisome. We immediately associate a diagnosis with a one-dimensional presentation when the majority of diseases that students see are presented in one skin tone. This limits our capacity to identify the ailment in other skin tones or to include it in our differential diagnosis. Until this narrow-minded diagnostic vision is substantially remedied with culturally competent in-person education—a difficult process that is currently not accomplished by all resident training programs—it will follow us into the wards, throughout residency, and into clinical practice. Updating textbooks and materials to incorporate newer evidence and moving beyond cultural stereotypes and biases is crucial for fostering an inclusive learning experience. Diverse perspectives, contributions, and histories should be accurately represented in educational materials to help students develop a more nuanced understanding of different cultures, promoting empathy and reducing stereotypes.

Therefore, updating textbooks and materials to incorporate newer evidence and moving beyond cultural stereotypes and biases is crucial for fostering an inclusive learning experience. Diverse perspectives, contributions, and histories should be accurately represented in educational materials to help students develop a more nuanced understanding of different cultures, promoting empathy and reducing stereotypes.

5.   *Developing Self-Regulation Skills in Students*

The literature search revealed 6 key self-regulatory mechanisms:

   i.   Cue Identification: Recognize individualized cues signaling powerful emotions or reactions.
  ii.   Teaching students how an adolescent Brain Develops: Introducing young individuals to their physiological stress responses, commonly known as "fight, flight, freeze, or fawn," can prove highly beneficial. This knowledge empowers individuals to consciously intercept and evaluate their reactions by recognizing and understanding these innate responses. Once learners can identify their initial instinctual response, they gain the ability to compare it with a more deliberate and thoughtful reaction.
 iii.   Conscious Interception and Regulation: Encourage learners to compare innate responses with deliberate reactions. Facilitate rational thinking during intense emotional states. Contribute to the gradual development of improved emotional regulation (Grotan, et.al., 2019).
  iv.   Individualized Coping Strategies: Adopt diverse coping strategies tailored to unique responses to stressors. Consider preferences for activities like physical exercise, journaling, or meditation.
   v.   Timing of Coping Strategy Planning: Plan coping strategies during calm periods or specialized advisory sessions. Recognize challenges in self-reflection during heightened emotional states.
  vi.   Personalized Approach: Acknowledge diversity in coping mechanisms. Foster a supportive environment for developing and applying effective self-regulation strategies.

Integrating strategies to develop self-regulation skills in students is essential for their academic success. This includes teaching methods for managing stress, building resilience, and promoting emotional intelligence. Providing resources and activities that help students

recognize and regulate their emotions can contribute to a positive learning environment and better academic outcomes.

6. *Promoting Collaboration and Student-Teacher Partnerships*

Creating opportunities for collaboration and establishing student-peer-teacher partnerships can enhance the overall learning experience. This involves encouraging teamwork, group projects, and interactive learning activities. Such collaborative approaches foster a sense of community within the classroom, promote diverse perspectives, and provide additional support networks for students facing academic and personal challenges (Somers & Wheeler,2022: Sweetman 2022).

Implications

The implications of the study extend to educators, educational institutions, and policymakers in the field of medical education.

Curriculum Development
The proposed Trauma-Informed Curriculum Framework provides a foundation for restructuring medical education to accommodate students with traumatic experiences. Incorporating evidence-based interventions, creating safe environments, and avoiding biases in educational materials is crucial to fostering an inclusive and supportive learning environment.

Educator Training
Educator awareness and training programs should be implemented to equip teachers with the skills needed to identify signs of trauma, understand diverse responses, and create trauma-informed learning environments. Professional development initiatives can contribute to a more empathetic and supportive educational culture.

Diversity and Inclusion
Efforts should be made to address cultural biases in medical education materials, ensuring accurate representation of diverse perspectives. Incorporating diverse case studies and avoiding stereotypes in examination questions contribute to fostering cultural competence among medical students.

Student Support Services
Institutions should consider integrating self-regulation skills development programs into their support services. Providing resources and activities that help students recognize and regulate their emotions can contribute to a positive learning environment and better academic outcomes.

Limitations

Despite the valuable insights provided by the study, several limitations should be acknowledged:

Generalizability
The study's findings may have limitations in generalizability due to the focus on a specific Caribbean medical school. Variations in institutional culture, student demographics, and educational systems may affect the applicability of the proposed framework to other settings.

Evolution of Trauma-Informed Education

The field of trauma-informed medical education is evolving, and the proposed framework may require adjustments as new research emerges. Ongoing updates and adaptations to accommodate advancements in the field are essential.

Resource Constraints

Implementing the proposed framework may need help in resource availability, including financial and personnel resources. Institutions may need to assess feasibility and allocate resources effectively to ensure successful integration.

In the not-too-distant future, it will not be unusual for prospective medical students to look into enrolling in medical schools that provide adequate academic support to students who have a history of traumatic psychological experiences. While trauma-informed care is being practiced in many K-12 organizations, trauma-informed pedagogy needs attention during the formative periods of medical education to avoid dropouts, failures, and unprofessionalism. Hopefully, this research on trauma-informed medical education will lead to the development of a feasible curricular framework for medical schools to follow. An early trauma-informed medical education would lead to greater equality by explicitly stating what changes are necessary for the pedagogy and infrastructure to support these students academically.

Appendix A
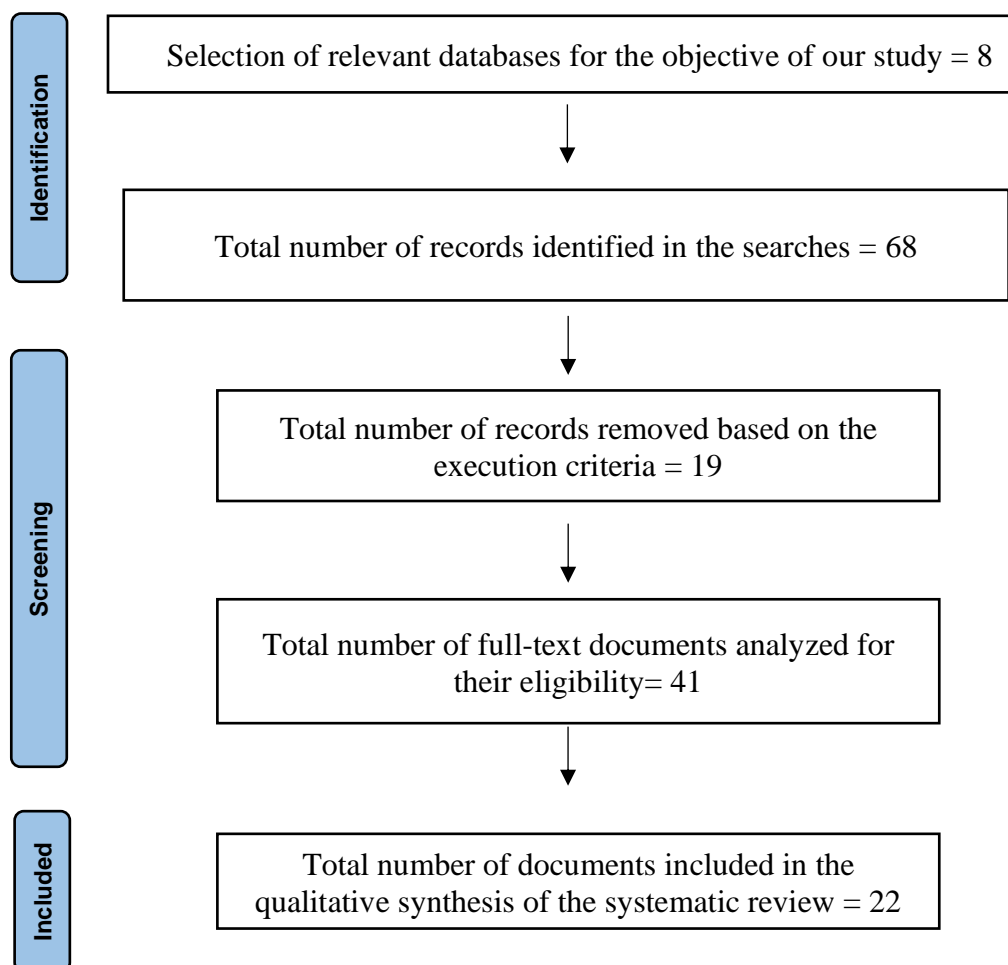
Selection of relevant databases for the objective of our study = 8

Total number of records identified in the searches = 68

Total number of records removed based on the execution criteria = 19

Total number of full-text documents analyzed for their eligibility= 41

Total number of documents included in the qualitative synthesis of the systematic review = 22

Identification

Screening

Included

Appendix B
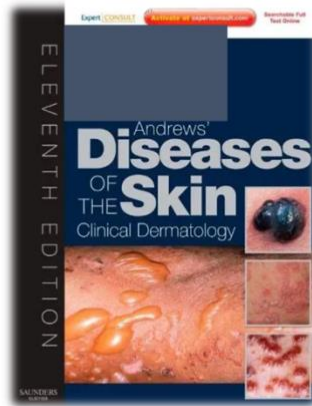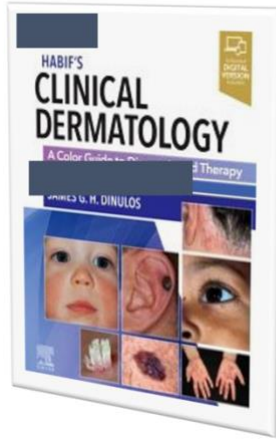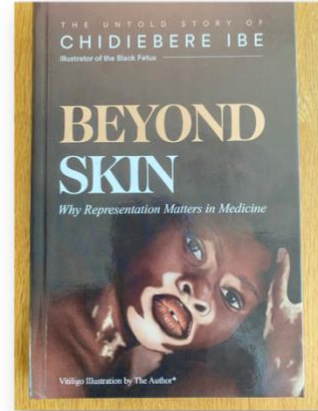
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Effectiveness of Video-Based Flipped Classroom on Students' English Achievements: A Meta-Analysis

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Abstract

Today, flipped classrooms (FC) effectively blend traditional education with social networks, encompassing both in-class and out-of-class environments. The popularity of FC increased its research numbers in many particular contexts and medium. The study specifically focusses on video usage as FC' medium of learning. Therefore, the present study aims to evaluate the impact of using the video-based flipped classroom on EFL students' outcome of their English Language learning. Through a meta-analysis, the selected 41 research papers from 2019 to 2023, involving 988 students were analyzed. Employing a quantitative approach, the analysis examines various moderators, including subject, object, duration, context, tools, and interaction. Findings reveal that a medium-sized sample (21-40 students), two teaching models, and multiple tools enhance the impact of video-based flipped classrooms on English learning outcomes. The video-based flipped classrooms significantly improve English learning achievement (effect size = 0.552) in both productive and receptive skills. The duration of the video has no significant effect. Furthermore, FC with video proves suitable for secondary, high school, and university-level students. The study suggests further exploration of theoretical and practical implications for supporting students' English achievement in video-based flipped classrooms.

Keywords: Flipped Classroom, Flipped Learning, Video-Based Learning, ELT

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Introduction

Flip Classroom (FC) pedagogy leads the growing educational shift through technology due to its contribution to suiting 21st-century education needs. FC concept, which characterizes learner autonomy, allows students to study new material through watching online videos, reading passages, and fulfilling online quizzes using technological aids (computer, mobile phone, tab, etc.) outside the classroom (Han, 2022; Lee & Wallace, 2018). In this concept, the classroom form encourages the teacher to design hands-on activities to activate the student's knowledge gained from online teaching. The records from previous studies mentioned that the new paradigm Flipped Classroom (FC) Model is slightly different from conventional education.

The process of FC directs the two-design learning process. Teachers transfer material, theory, and knowledge from home online through various media. Following the process, the students receive the material online. In the classroom section, they were invited to confirm their knowledge with peers and teachers and forced to do some exercises to get an optimal understanding of the material. FC has recognized its valuable benefits, such as letting students study materials whenever and wherever they want (Bishop & Verleger, 2013), helping students learn more about the course material (Gaughan, 2014), improving students' critical thinking and problem-solving skills (Fautch, 2015), making sure students are ready for class (McCallum et al., 2015), and using class time for active learning and getting students more involved in the class.

In the context of FC, studies claimed that the use of flipped classes in the educational process implementation has a beneficial effect on the learning process, such as enhancing a lively learning environment and raising student achievement levels in the classroom (Hew et al., et al. 2021; Hew et al., et al. 2021; Shahnama, 2021). However, numerous studies have documented the FC shortcomings. Discovered that the students' lack of preparation affected their efficacy. They are quickly irritated when watching videos or other content (Nguyen et al., 2019). Additionally, the student's motivation is more important in creating an exciting environment for FC (Wang, 2017). Monitoring students' understanding and comprehension while they engage in learning activities outside the classroom and providing feedback that meets their needs is another factor contributing to FC's reduced efficacy (Milman, 2012). Nonetheless, numerous types of research have documented the FC's shortcomings.

One of the suggested learning materials to make online learning more effective, especially in the flipped classroom, is integrating video lectures or video-based material before in-class activities (Naffi et al., 2020). According to Hwang et al. (2015), the video can help students engage in self-learning. For example, these videos can be created independently or accessed through social media by the teacher. Further, video-based learning serves as a medium that activates both students' auditory and visual senses (Amer, 2022). The essential aspect of implementing flipped classrooms lies in developing video-based learning materials intended for students' engagement outside the traditional classroom or in a class setting. Thus, video-based learning entails capturing live visuals to effectively deliver educational content, enabling students to attain their learning objectives, especially in fostering students' achievement.

In the k12 education context, FC has encouraged many researchers to examine its practice effectiveness. Prior meta-analysis studies are addressed (Hew et al., et al. 2021; Hew et al., 2021; Njie-Carr et al., 2017; Santhanasamy & Yunus, 2022), but there are two key findings

from those studies. First, few studies have compared the effectiveness of FC, specifically that video was used in the outside classroom to traditional classes in learning new languages, particularly English. It becomes significant because giving students plenty of exposure and practice time while they are learning English is crucial. This approach can help students receive more in class.

Moreover, video use has been proven to give students more exposure and motivation to learn. Second, some moderator variables in the application of FC should have been addressed in previous studies. It results in a need for more thoroughness. More variables will be used in the current meta-analysis, including all studies conducted from 2019 to 2023.

According to Sung, Yang, & Lee (2017), student achievement usually utilizes standardized tests to assess how well students have learned or applied their knowledge, typically used to gauge learning achievement. In English language teaching, the student's language achievements focus on language proficiency and mastery of receptive and productive language skills. The standardized examination can be in several forms: performance evaluations, oral interviews, writing assignments, and classroom observations can assess language achievement, including students' listening, speaking, reading, writing, grammar, vocabulary, and pronunciation skills.

This meta-analysis study aims to synthesize the impacts of video-based flipped classes in an ELT context. The study seeks to address the following research questions: (a) In the context of English Language Teaching, what is the overall impact of the video-based flipped classroom approach? (b) What outcome variables most impact the size of the measurable flipped classroom effect? Moreover, (c) Are there any effects of the flipped classroom technique influenced by the characteristics or factors of the research? The current research is significant in discovering the capability and areas of video-based flipped learning in ELT, which draws theoretical significance for lecturers, higher education stakeholders, and other educators.

Literature Review

The Trend of Video-Based Flipped Classroom (FC)

To gain the meaning of literature of video-based FC, the term of Flipped Classroom (FC) approach should be discussed first. FC is a model of learning inverts the traditional classroom by including pre-class time, then followed by in-class section that promote students' active, innovative, practical learning activities. Abeysekera & Dawson (2015) pointed out that FC is a "set of instructional methods that (1) shift most information-transmission teaching outside of class; (2) use class time for learning activities that are active and social; and (3) demand students to finish pre- and/or post-class activities for maximum benefit from in-class work".

In the outside class activities, many teachers preferred to utilize video or other media (Han 2022; Lee and Wallace 2018; Öztürk and Çakıroğlu 2021). Their decision is in line with several favor of FC model, such as improving student academic performance and other beneficial elements of education. Despite its advantages, several weaknesses on using FC in pedagogical context are found, such as lack of access to recourses, technological issue, self-regulation and motivation, students' workload.

Videos used in outside-class FC are proven effective tools for learners, providing a comprehensive understanding and the ability to apply acquired knowledge in various contexts. To promote interactive learning, teachers can supplement traditional resources with video materials, enabling students to engage at their own pace and enhance face-to-face interactions (Onojah et al., 2019). Therefore, incorporating self-learning video lectures in the FC setting, have shown positive learning outcomes, in which allowing students autonomy and a solid foundation for in-class activities (DeLozier & Rhodes, 2017). Moreover, videos also contribute to student engagement, especially when combined with in-person teaching (Brame, 2016; Noetel et al., 2021). Active learning through videos encourages critical thinking and problem-solving (Niemi, 2002), optimizing class time for interactive discussions (Sams & Bergmann, 2013).

English Language Achievement

The term "English Language Achievement" describes a person's level of achievement or skill in using the English language. It includes a variety of abilities such English speaking, writing, listening, and reading. English language proficiency is usually assessed by tests, evaluations, or assessments that gauge a person's language proficiency and mastery of English grammar, vocabulary, comprehension, and communication skills. It is frequently used to assess someone's proficiency in English as a second language or as a foreign language and may be crucial in a variety of contexts, including social, professional, and educational ones (Kintan, 2022). In this study, the language skills are delivered in the form of flipped learning where students can could enhance the skill both inside or out class activities with various mode that utilized by their English teachers, especially video.

Meta-Analysis

Meta-analysis refers to a statistical technique used to combine and analyze the results of multiple independent studies on a particular research query or topic. In ber book, Retnawati et al. (2018) cited that meta-analysis involves meticulously reviewing and synthesizing data from multiple studies in order to draw broader conclusions and more precise and reliable estimates of the investigated effects or relationships. The primary purpose of meta-analysis is to provide a comprehensive and objective summary of previously conducted research. It allows researchers to increase the sample size, which enables the identification of consistent patterns and trends across studies. It also aids in revealing the extent, direction, and consistency of effects. The last, meta-analysis can resolve controversies and inconsistencies: when individual studies produce contradictory or inconsistent results. Thus, since numerous studies existed in the context flipped classroom, the researcher intended to find the precise and reliable finding the effectiveness video-based on English Language Achievement.

Methods

This study utilizes a quantitative research approach with a meta-analysis design to achieve its objectives. The main goal is to determine the significance of the average impact of the Video-based flipped classroom (FC) on English learning achievements. Meta-analysis allows for an overall examination of the effect size of FC on English learning achievements by analyzing the results of previous studies using statistical methods.

The research data for this study was obtained from Publish or Perish, a software that provides relevant references. This application aids researchers in retrieving and analyzing relevant

studies in a comprehensive and concise manner, offering a systematic approach to literature review. In Publish or Perish, the researcher selected Google Scholar, and Scopus as filtering sources due to their accessibility. These two platforms were chosen because the researcher could open and access them.

Inclusion and Exclusion Criteria

In this meta-analysis, a thorough set of inclusion and exclusion criteria was created. According to Table 1, each publication in this study focused on using flipped classroom approaches to teach English in any skills. All of the articles were authored in English and published between 2019 and 2023. The studies also compared the flipped classroom with traditional teaching strategies using quasi-experimental and experimental study designs. Both between- and within-subject comparisons were used to quantify the student learning outcomes. Articles that provided thorough data (mean, standard deviations (SD), sample size, and associated inferential statistical test values like t-value) to compute effect sizes were also taken into account. Studies were considered as valid if the learning or behavioral outcomes for the experimental or observational groups were quantified and precisely described.

Table 1: Studies Criteria

Criteria	
Learning content	Flipped Classroom (FC) for English Language Teaching
Language	English
Timeframe	Published between 2019-2023
Literature type	Peer-reviewed articles & conferences and proceedings
Research design	Experimental, quasi-experimental
Implementation	Flipped classroom
Accessibility	Both open access articles and library repositories offer full texts.
Research outcomes/results	Clearly stated educational results

Identification and Selection of Articles

There are three phases in the stage of identification and selections of the articles. Firstly, to make sure they were pertinent to flipped classroom in English Language Teaching (ELT) context, the titles and abstracts were screened by the researcher. Secondly, review articles, thesis/dissertation, and the articles that reported other discipline beside ELT were excluded. Therefore, all selected studies move in to Microsoft Excel spreadsheet. Thirdly, duplicates studies were also excluded (See Figure 1).
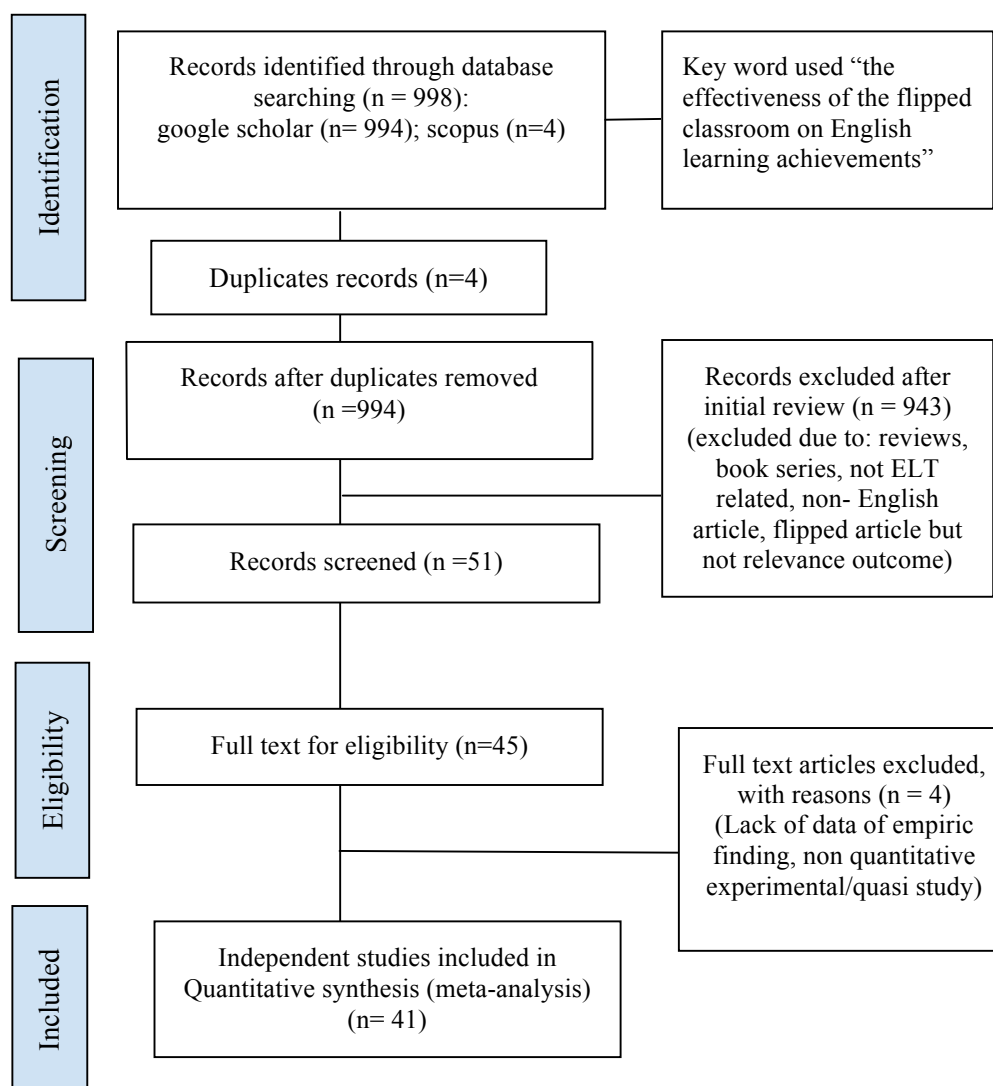
Figure 1: Prisma Data Selection

The keyword used in the search was "the effectiveness of the flipped classroom on English learning achievements". In the initial search, a total of 994 articles were downloaded from Google Scholar, and 4 articles were obtained from Scopus, within a limit of 1000 articles. After excluding irrelevant articles, duplicates, papers lacking conceptual similarity, and studies that did not report English language achievement, subject, objectives, rules and context, interactions, and tools, as well as those without sufficient statistical information, a final selection of 41 studies were made for this meta-analysis research. These articles specifically addressed English learning achievements in the flipped classroom setting and implemented experimental methodologies.

Statistical Analysis: Meta-Analysis

A meta-analysis study must follow certain procedures in order to produce the evidence needed to respond to the study's research questions. The impact of flipped classrooms (FC) in enhancing students' English learning achievement is examined in this meta-analysis. In order to establish the explanation for the significance, the support of variable moderators in each study included in this analysis is important.

The procedures of conducting a meta-analysis are clearly discussed by When conducting a meta-analysis that employs study parameters in the form of means, researchers must consider whether each study measures variables on the same scale. The standard error of the effect size for the same size across studies and different formulas. The application utilized in this stage is software. This study's meta-analysis utilizes artifacts or studies on variables with the same scale. The effect size—the average score of certain variables that are the focus of each study—is taken as the mean in this meta-analysis. In this study, the effect size calculation that will be used is Hedges'g because it has an inbuilt correction for bias when the sample size is small.

Results and Discussion

In this section, the findings of the study including effect size & standard error, overall effect size, forest plot, heterogeneity test, and variable moderators are presented.

Effect Size and Standard Error

The first result analysis in the openMEE analysis is the result display standard error (SE) and effect size (ES) calculation. The two calculations are presented below:

Table 2: Study Identity, Effect Size and Standard Error

	Study Identity	ES	SE		Study Identity	ES	SE
1	(Al-Jarrah et al. 2021)	1.405	0.100	22	(Vaezi 2019)	0.014	0.051
2	(Al-Jarrah et al. 2021)	0.064	0.080	23	(Alkhoudary and AlKhoudary 2019)	0.027	0.080
3	(Daulay 2021)	2.882	0.102	24	(Alkhoudary and AlKhoudary 2019)	-1.351	0.123
4	(Etemadfar, Soozandehfar, and Namaziandost 2020)	1.668	0.135	25	(Alsamadani 2022)	1.174	0.107
5	(Lin and Hwang 2018)	0.593	0.080	26	(Ahmed et al. 2022)	2.156	0.105
6	(Liu, Sands-Meyer, and Audran 2019)	-0.797	0.086	27	(Jalili, Khalaji, and Ahmadi 2020)	0.011	0.155
7	(Khadjieva, I., 2019)	-0.031	0.067	28	(Khabir, Fazilatfar, and Razmi 2022)	1.582	0.115
8	(Shooli 2022)	1.612	0.066	29	(Khooban et al., n.d.,2022)	0.005	0.133
9	(D Umutlu and Akpinar 2020)	0.623	0.128	30	(Nhac 2022)	-4.152	0.210
10	(D Umutlu and Akpinar 2020)	0.786	0.120	31	(Singh and Harun 2021)	1.287	0.060
11	(D Umutlu and Akpinar 2020)	1.105	0.122	32	(Singh and Harun 2021)	1.749	0.069
12	(Umutlu& Akpinar, 2020a)	0.950	0.127	33	(Mubarok, Cahyono, and Astuti 2019)	0.642	0.073
13	(D Umutlu and Akpinar 2020)	0.729	0.111	34	(Mubarok et al. 2019)	1.315	0.157
14	(Duygu Umutlu and Akpinar 2020)	0.714	0.118	35	(Mubarok et al. 2019)	1.144	0.173
15	(Duygu Umutlu and Akpinar 2020)	0.655	0.129	36	(Abedi, Keshmirshekan, and ... 2019)	0.031	0.125
16	(D Umutlu and Akpinar 2020)	1.403	0.138	37	(Öztürk and Çakıroğlu 2021)	0.447	0.084
17	(Umutlu & Akpinar, 2020)	0.787	0.114	38	(Öztürk and Çakıroğlu 2021)	1.015	0.092
18	(Umutlu & Akpinar, 2020)	0.291	0.116	39	(Öztürk and Çakıroğlu 2021)	0.625	0.086
19	(D Umutlu and Akpinar 2020)	0.474	0.106	40	(Öztürk and Çakıroğlu 2021)	0.737	0.087
20	(D Umutlu and Akpinar 2020)	0.415	0.114	41	(Öztürk and Çakıroğlu 2021)	0.976	0.091
21	(Vaezi 2019)	0.019	0.051				

Mean Effect Size

In this present study, a random test of effect model was utilized to calculate the mean effect size of the forty-one studies.

Table 3: Coefficients or Mean Effect Size

Coefficients

	Estimate	Standard Error	z	p	95% Confidence Interval	
					Lower	Upper
intercept	0.552	0.169	3.265	0.001	0.221	0.884

Note. Wald test.

*r=0.1 (low); r=0.3 (medium); r=0.5 (high) (Cohen, 1988)

The outcome of the video-based FC paradigm on English learning achievement may be evaluated from Table 3. 0.552 is the estimated coefficient. For a learning process to be successful, a score of 75 is required (Candra & Retnawati, 2020; Retnawati, 2014). We can infer that the estimate coefficient has not gotten to the required level. It is not 75 or more. This indicates that the flipped classroom approach is not having a significant influence on the English model (Candra & Retnawati, 2020; Retnawati, 2014).

Forest Plot

Study	Effect [95% CI]
Study 1	1.40 [1.27, 1.54]
Study 2	0.06 [-0.09, 0.22]
Study 3	2.88 [2.74, 3.02]
Study 4	1.67 [1.48, 1.85]
Study 5	0.41 [0.26, 0.57]
Study 6	-0.80 [-0.97, -0.63]
Study 7	-0.03 [-0.16, 0.10]
Study 8	1.61 [1.48, 1.74]
Study 9	0.43 [0.26, 0.61]
Study 10	0.55 [0.38, 0.71]
Study 11	1.10 [0.94, 1.27]
Study 12	0.66 [0.49, 0.83]
Study 13	0.51 [0.36, 0.66]
Study 14	0.50 [0.34, 0.66]
Study 15	0.45 [0.28, 0.63]
Study 16	1.40 [1.22, 1.59]
Study 17	0.55 [0.39, 0.70]
Study 18	0.20 [0.04, 0.36]
Study 19	0.33 [0.18, 0.47]
Study 20	0.29 [0.13, 0.44]
Study 21	0.02 [-0.08, 0.12]
Study 22	0.01 [-0.09, 0.11]
Study 23	0.03 [-0.13, 0.18]
Study 24	-1.35 [-1.52, -1.18]
Study 25	1.17 [1.03, 1.32]
Study 26	2.16 [2.01, 2.30]
Study 27	0.01 [-0.20, 0.22]
Study 28	1.58 [1.43, 1.74]
Study 29	0.00 [-0.18, 0.19]
Study 30	-4.15 [-4.44, -3.87]
Study 31	1.29 [1.17, 1.40]
Study 32	1.75 [1.61, 1.88]
Study 33	0.45 [0.30, 0.59]
Study 34	1.31 [1.10, 1.53]
Study 35	1.14 [0.91, 1.38]
Study 36	0.03 [-0.14, 0.20]
Study 37	0.31 [0.15, 0.48]
Study 38	1.01 [0.83, 1.20]
Study 39	0.43 [0.27, 0.60]
Study 40	0.51 [0.34, 0.68]
Study 41	0.68 [0.50, 0.86]
RE Model	0.55 [0.22, 0.88]

Figure 2: Forest Plot

The size of the effect size aggregation is shown by the location of the diamond at the bottom, whose area represents the whole area of the total weight of each study (Retnawati, H.; Apino, E.; Kartianom; Djidu, H.; Anazifa, 2018). From the forest plot of the present study, the study no 2 is the largest confidence, it is the study from Al-Jarrah et al. (2021). The study no 2 analyzed secondary students' grammar using FC setting. Furthermore, the smallest confident interval is the study number 30 from Nhac (2022)' experiment which utilized 15 minutes video to teach students vocabulary using video-based FC.

Heterogeneity Test

Table 4: Heterogenity Test

Fixed and Random Effects			
	Q	**df**	**p**
Omnibus test of Model Coefficients	10.657	1	0.001
Test of Residual Heterogeneity	5291.055	40	< .001

Note. p -values are approximate.
Note. The model was estimated using Hedges method.

The Q statistics value obtained for the Residual Heterogeneity test from Table 3 is 5291.055 with df (k - 1) = 40 and p-value < 0.001. This outcome invalidates the H0 hypothesis that the data is homogeneous. Retnawati, H.; Apino, E.; Kartianom; Djidu, H.; Anazifa (2018) based it on the crucial criteria for the rejection area; H0 is rejected if the p-value 0.05 with a significance level of 95% (=0.05). The data is heterogeneous because H0 is discarded.

Variable Moderators

The results of the data analysis in the heterogeneity test are caused by variable moderators. There five variables in this study: subject, objectives, rules, context, sources. The research gathered are categorized using the variable moderators. The variable moderators and their inclusion in the current meta-analysis are detailed in greater detail in Table 4. The heterogeneous studies included in this meta-analysis are due to several sub-dimensions typically included in video-based FC, which the variable moderators cause. These are the potential moderator variables that could be utilized to distinguish between each finding of FD on the video-based flipped classroom investigation. Additionally, that data is necessary to investigate the precise impact of FC in a meta-analysis study.

Table 5: Variables Moderator

Dimension	Sub dimension	Coding Scheme	n/Percentage
Subject	Sample size	Small 1-20	46.3
		Medium 21-40	53.7
		Big 41-60	0
	Level	Primary	4.9%
		Secondary	9.8%
		Varsity	85.4%
Objectives	Result of Learning domain	Integrated	13.9%
		Per-skill/component	86.1%
	Skills Type	Recitative skill	40.5%
		Productive skill	42.9%
		Recitative & Productive skills	16.7%
Rules	Video duration	Short (1'-10')	7.3%
		Medium (10'-30')	48.8%
		Long (30'-50')	2.4%
		Unidentified	41.5%
	Video play tool	Social Media	19.5%
		CD/FD	7.3%
		LMS/ Web-based	43.9%
		Unidentified	29.3%
	Video sources	YouTube	48.4%
		Self-Produced	16.1%
		Other Sources	19.3%
		Self-Produce &YouTube	9.7%
Context	Country	Asian	97.6%
		Europe	2.4%
Sources	Publication Type	Scopus	7,14%

The high confidence interval was a medium sample size to deal with the subject variable. Studies with a smaller sample size demonstrate a stronger effect than those with a larger sample size. This may be because relatively few studies have used small sample sizes. This study also discovered that the biggest impact size was associated with a medium sample size. The fundamental explanation is that fewer sources of variation are present in a small sample size, which results in a greater effect size (Slavin et al., 2009). Then the varsity subject also got the strongest effect.

This table presents the distribution of data across different dimensions and sub-dimensions, along with the corresponding coding schemes and percentages. The discussion for each dimension and sub-dimension:

In term of subject, the sub-dimension namely sample size found that the majority of the sample size falls within the medium range (21-40), accounting for 53.7% of the total, while a smaller portion falls within the small range (1-20) at 46.3%. There are no cases in the big range (41-60).

For the level dimension, its data indicates that the Varsity level dominates with 85.4%, followed by Secondary with 9.8% and Primary with 4.9%.

In addition, the objectives dimension, particularly result of learning domain: the distribution shows that 86.1% of the data is related to per-skill/component, while the rest (13.9%) is

integrated learning domain. In the same dimension, the skills type data is divided into recitative skill (40.5%), productive skill (42.9%), and a combination of both recitative and productive skills (16.7%). Regarding objective variables, teaching English per skill, not integrated skills, was determined as the largest effect size. This result may be caused by the fact that the appropriate implementation of the flipped classroom will be effective in each domain of learning outcomes, whether viewed as a whole or by skill/competency.

Next is about the rules used in the studies. First sub-dimension is the video duration in FC classroom data, which indicates that the majority of the video duration falls within the medium range (10'-30') at 48.8%, followed by short (1'-10') at 7.3%. A significant portion is unidentified (41.5%). In sub-dimension video play tool, the LMS/Web-based is the most commonly used video play tool, accounting for 43.9%, followed by Social Media (19.5%), and CD/FD (7.3%). A considerable portion is unidentified (29.3%). Further the video Sources data found that YouTube is the predominant video source at 48.4%, followed by self-produced sources at 16%. Therefore, the medium-length video duration that utilizes a web-based Learning Management System (LMS) as the media and YouTube as a video resource statistically got their highest interval confidence in each category.

The findings also indicate that the video-based FC method for teaching English has the greatest effect size in Asia. This is because Asian countries must adopt student-centred learning for teaching English as a foreign language. In line with the findings of Zheng, Bhagat, Zhen, and Zhang's meta-analysis (Zheng et al., 2020), the meta-analysis is more significant in some developing countries because it can facilitate learning in these nations.

This breakdown provides a detailed insight into the distribution and percentages within each dimension and sub-dimension, offering valuable information for analysis and decision-making.

Bias Publication

This test is carried out to determine whether the data that has been collected can be used as a representative sample of its population or not by looking at representative sample of the population or not by looking at whether the funnel plot shows a symmetrical or asymmetrical shape, whether the funnel plot shows a symmetrical or asymmetrical shape. The test publication bias test is carried out with the funnel plot in the following figure.
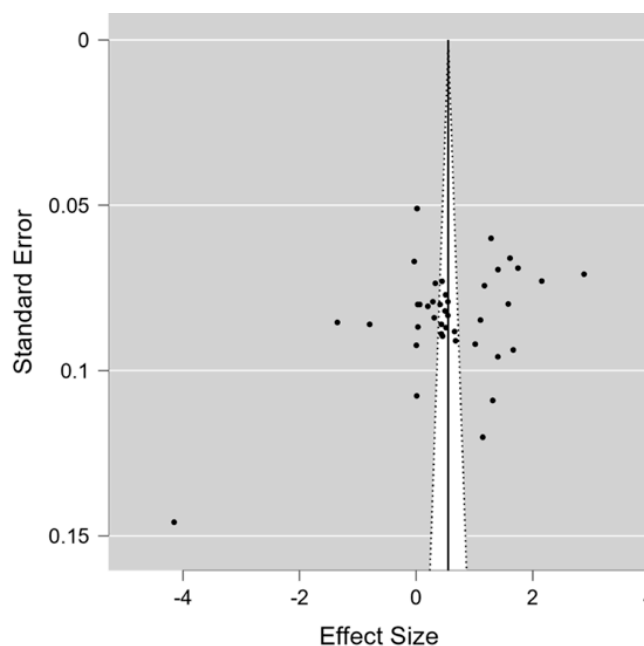
Figure 3: Effect Size

From figure 2, it can be seen that the distribution of the data was even. Therefore, it may be said that this publication is impartial. In other word, funnel plot result shows that the 41 studies are not biased, or in other words, that they are valid, based on the results of several tests designed to detect biased publications. Providing English learning inclusion strengthens the conclusion of the meta-analysis that the flipped classroom is demonstrably effective for enhancing students' English learning achievement.

Conclusion and Suggestion

The present meta-analysis study provides evidence of substantial gain in the effectiveness of video-based flipped classrooms on English learning achievement. The achievement found comes from the positive effect of the video-based flipped classrooms and several moderator variables. This study found that 41 studies included argued that the video-based flipped classroom model has a high effect size on English learning achievement for g = 0.552, in terms of all English skills, both productive and receipted skills. The data also show that the success of flipped classrooms is affected by seven moderator variables from activity theories. The moderators found that Video FC is effective when the class have a medium sample size and teaches productive and component skill. It is also argued that using videos formed in medium length, utilising web-based or social media in playing and taking from YouTube as a resource to learn are factors with moderated effect sizes.

The results of this study provide insight that can be implemented in the following English-learning flipped classroom, especially regarding video material. The findings also strengthen and validate the learning activities during online or hybrid forms, which halted all academic pursuits. This model can be used as a learning method for English lessons. This opportunity can be used to instruct students to master material before the actual class, in-class, or online applications due to students' greater access to technology and information at home. Implementing a reversed classroom will inevitably result in more efficient time spent learning material. This model aids in the process of learning. In addition, English is a subject that requires extensive practice. The benefits of flexible classrooms encourage English language acquisition.

Recommendations are made for the next researcher to increase the years covered to obtain more complex findings and analyses. The moderator variables may differ according to the requirements of each researcher. Further, for future studies, it is suggested to explore more theoretical and practical implications of video-based flipped classrooms supporting students' English achievement. Additionally, the study recommends testing other variables' influence on the success of the flipped classroom and addressing the shortcomings of the flipped classroom, such as students' lack of preparation, motivation, and understanding while engaging in learning activities outside the classroom. Furthermore, future research could compare the effectiveness of the flipped classroom with traditional classes in learning new languages, particularly English, and address the need for more thoroughness in addressing moderator variables in the application of the flipped classroom. The study's findings provide valuable insights for educators, researchers, and policymakers, and future research in this area could contribute to the ongoing development of effective teaching methods in English language education.

Acknowledgements

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Practices and Challenges of Learner Autonomy in English Learning: Voices From High and Low Achievers

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Abstract

Autonomy of English language learners in EFL contexts has long interested scholars to investigate how autonomy is practiced and ways to promote it. However, there seems less research investigating how learner autonomy is practiced among students from different academic competence levels. Therefore, this qualitative study aims to investigate students' practices and challenges of autonomy in learning English. This study involved two high school students (high and low achievers) in an EFL classroom. Both students' English proficiency was categorized based on academic achievement judgment. The data were collected through online questionnaires designed to gauge students' frequency in carrying out activities supporting learner autonomy and semi-structured interviews asked to ascertain those activities and identify challenges students face in doing the practices. The study's findings reveal contrastive practices in terms of learning quality and material access among the high and low achievers. Likewise, different considerable challenges are found. The high achiever perceives limited time of learning as the most affecting constraint whereas another participant lacks learning motivation since he feels no relevance between English and his real world. Interestingly, the willingness of both low and high achievers to practice autonomy in learning is similar; notwithstanding, they expect the teacher to always provide them with related materials to be learned inside and outside the classroom. The study's results suggest teachers fully encourage and facilitate students to engage them with activities supporting their autonomy.

Keywords*: Learner Autonomy, Autonomy Practices, Autonomy Challenges, High Achiever, Low Achiever*

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Introduction

Over the years, there have been growing interests in the promotion of learner autonomy in English language teaching and learning. Many researchers have proven that learner autonomy contributes to the success of English as Foreign Language learning (Hsieh & Hsieh, 2019; Rahman & Suharmoko, 2018; Tran, 2020). The studies are in line with the theory of the learner autonomy emergence which tries to specify the roles of teachers and learners in the teaching and learning process. Cotteral (1999) defined the theory of learner autonomy in that it is the movement of teachers and students' roles which used to focus on teachers as presenter, explainer, encourager, and determiner of students' learning and how to assess its result, meanwhile, students are meant to be controlled by those roles of teachers. This issue is a serious challenge regarding the relationships between teachers and learners. Thus, learner autonomy is the result of the challenge and aims to help students to take charge of their own learning (Holec, 1981 and Little, 1991).

In the traditional view of teaching and learning, learners tend to be passive since they are not persons in charge to determine what and how to learn. Instead, all information is provided by teachers, and learners absorb the information with no evaluation and reflection. This traditional view has been gradually replaced and changed by the new shift called learner autonomy. Holec (1981) coined the term learner autonomy in the context of language learning in Europe. Holec mentioned that autonomous learners can define their own goals and strategies for understanding and evaluating their own development in language learning.

Similar issues and challenges exist in English language instruction in Indonesia. Having a look at the *Kurikulum Merdeka* as the new curriculum implemented in Indonesian education, it is strongly suggested that learning is conducted by having a learner-centered approach. (Lengkanawati, 2019). This is due to the fact that skills needed in the era of 4.0 require learners to have soft skills, good characters, and literacy-numeration skills. Regarding these crucial, student-centered learning is one way to develop those skills since it involves criteria such as depth cognitive and social skills, personal growth, and social maturity.

However, English language learning in Indonesia is dominated by teachers. This issue has become a problem since the learning process tends to be teacher-centered. Lengkanawati (2019) revealed that teachers have not well promoted learner autonomy as one of the key objectives in language teaching and learning. Furthermore, it cannot be neglected that learner autonomy still faces a challenge in Indonesian context since the standard norms set in the culture of education emphasize center to teachers. The norms include the principles of total obedience, the unquestioning mind, the concept of elders-know-all, and the beliefs that teachers are always right as well as do no wrong (Dardjowidjojo, 2001).

Promoting learner autonomy has become a challenge since Indonesia's educational setting involves a big classroom of more than 25 students. This results in teachers' difficulty in supporting students to have a learner autonomy attitude. In other words, self-directed learning does not normally happen in most schools in Indonesia. Ramadhiyah (2018) described that the culture of students just being recipients is very popular in Indonesia. Students tend to rely on teachers' explanations and decisions in learning without voicing their own and asking 'why'. Padmadewi (2016) is also in agreement in this situation in that the traditional cultures of students and teachers' role in teaching and learning process leads students to not perceive needs for studying English causing them to be unenthusiastic to take chances in learning.

The fact that learner autonomy is rarely promoted in language teaching and learning in Indonesia has encouraged researchers to investigate the promotion of learner autonomy with different strategies. However, in the Indonesian English language setting, studies on learner autonomy are limited to how teachers perceive learner autonomy, how technology is used in promoting learner autonomy, and how learner autonomy is practiced in university and public high school. However, the practices investigated are generalized among all learners, whereas in reality students vary. This issue has interested the researcher to conduct study on learner autonomy to two different students: high and low achiever. Thus, the present study aims to answer:

1. How is learner autonomy practiced by the high and low achiever?
2. What are challenges encountered by the two different learners to be autonomous in learning?

Method

Research Design

The study employed a qualitative descriptive design to describe the phenomenon in the field and provide a rich description of the experience. The qualitative descriptive design seems to be suitable for this study since it attempts to provide detailed information on practices students are likely to undertake to encourage themselves to become autonomous learners in learning English, and challenges students encounter regarding learner autonomy implementation. Moreover, the study is considered as a qualitative descriptive since it will focus on the exploration of learner autonomy at two different levels of students.

Research Participants

The study involved two students with different academic levels, a high achiever and a low one. They were selected based on the teacher's judgment on their academic competence, especially in English learning. There are some reasons underlying the selection of the two participants. To begin with, previous research on learner autonomy was found to generalize students and treat them as the same levels, thus this issue has interested me to conduct a study on learner autonomy to different levels of students. Secondly, there was research I previously conducted to these two participants aiming at revealing their motivation in learning English. The bond has been developed between us and it encourages certain openness in the participants' responses to the researcher's questions in this study. To avoid biases in inappropriate portions, I undertook this study by collaborating with my academic advisor who is an experienced researcher and expertise in the topic of learner autonomy. The participants were distributed questionnaires. In addition, selected students based on the questionnaire results will be interviewed to explore their responses.

Research Instruments

In the study, qualitative data were collected beginning with revealing the participants' tendency in undertaking activities encouraging them to be autonomous through a 5 point *Likert-scale questionnaire*. The questionnaire also aims at answering the first research question regarding practices of learner autonomy the students are likely to undertake. The questionnaire begins with asking students about their perception of their own and the teacher's role in learning and followed by autonomous activities they carry out by using the framework of Joshi (2011). Since this is a qualitative study, a more exploration of students'

responses to the questionnaire was conducted through an open-ended interview to enrich research question 1 and answers research questions 2 (challenging students encounter in carrying out autonomous activities). The interview was also conducted by following the aspects of learner autonomy proposed by Joshi (2011). The selection of this framework was based on the fact that Joshi's is really appropriate to answer both research questions being studies, despite its widely used by previous researchers in the field.

Data Collection and Analysis

The questionnaires were distributed through a google form. After collecting data from the questionnaires, follow up interviews were conducted as well as recorded to selected students based on responses obtained from the questionnaire results. Results from students' questionnaires were analyzed by looking at the items students answer both similarly and differently. After the tendency of activities students undertake is obtained, they were explored more through interviews. Results from the interviews were focused, categorized, and transcribed. The data then were displayed based on Joshi"s (2011) framework: perceptions of their own roles and teachers" roles and autonomous activities students are likely to undertake. Lastly, conclusion drawing will be done by referring to research questions 1 and 2.

Findings and Discussion

This section discusses results obtained from both online questionnaires and interviews conducted to the high and low achieving students regarding their practices of autonomy and challenges they encountered in learning English.

Practices of Learner Autonomy

Categories specified by Joshi (2011) were used to describe practices of learner autonomy both high and low achievers have. The description consists of the learner's perception of their own and teacher's roles and autonomous activities they carry out. In relation to students' role in learning English, results obtained from the questionnaires show that both participants have quite similar perceptions about their roles as English learners in that students should be all responsible for finding their own ways of practicing English and should build a clear vision of reasons why they learn English. However, completely different voices, if not opposite, were revealed when they were confirmed and explored more through interview, as indicated in the following excerpts:

> *"I have to be serious in studying because I want to pursue my education abroad. I keep my goals, but I also have to focus on the teacher's goals because they are related. Since I have my personal goals and what is taught at school is also important, I just balance it."* (Excerpt from high achiever)

> *"My goal in learning English is to gain knowledge related to things I initially did not know. I do not have anything more serious such as to prepare myself or work later. I also follow the teacher's way more than my own way in studying English."* (Excerpt from low achiever)

The high achiever stated that having clear vision and purpose of learning English is crucial in addition to learning goals specified by teachers, so her purpose does not merely come from herself nor the teacher. She has her own learning goal, to be able to master English since she

wants to later continue her study abroad, but she is also eager to first reach the learning goals set by the teacher. Moreover, she believes that the teacher's learning goal does not contradict her own goal; instead, it helps her to become more fluent in using English. Dissimilar with the voices from the high achiever, the low one has completely different perception on vision of learning English, if not opposite. To him, learning English is simply to gain knowledge on materials he was previously not familiar with. As a result, since he also does not have long-term ambition, learning goals specified by teachers are extremely favored. How both participants perceived their roles in learning English appears to influence their practices of autonomy. While the high achiever tends to combine her own and teacher's way, the low one depends merely on the teacher.

In relation to students' perception of teacher roles, and in line with students' responses above, the questionnaire results show that the high achiever agrees that a lot of learning can be done without the teacher while the low one strongly disagrees with the statement. Notwithstanding, their voices seem to be quite similar after more explored in the interview, as exemplified below:

> *"In learning, I follow the teacher's way, but I also look for material from other sources, usually via Youtube by listening to songs and then I can find out the meaning of the song. Whenever I face difficulty, I will ask the teacher to explain. The way the teacher teaches really influences me. I agree that if the teacher's way of teaching does not suit me, I will not understand. However, I can study on my own without a teacher if learning resources are provided."* (Excerpt from high achiever)

> *"I can't study without the teacher. I find it more difficult to understand the material because I am not guided, and I become lazy. I hope that the teacher always provides materials and notes for us. If no examples are given, I prefer to copy because I don't understand and I'm afraid of being wrong. If there are things I don't understand, I also need to ask the teacher."* (Excerpt from low achiever)

Surprisingly, the high achiever is also dependent on the teacher's way of teaching, if not a hundred percent, despite her previous answer that students should have their own clear vision in learning. Her desire to learn English from resources other than just those provided by the teacher show that she is actually able to learn without the teacher as long as the guidance exists to help her deal with difficulty in learning. The practices actually confirm how scholars have conceptualized learner autonomy, in which it is a quite well-established concept. Holec (1981), as the originator of the concept, stated that learner autonomy is not learning without a teacher. Some previous studies also voice that learner autonomy is strongly connected to teacher's guidance and facilitation, and teachers should employ various supporting strategies (Bozack, A. R, et al, 2008; Yuzulia, 2020; Wiraningsih and Dewi, 2020).

More strong dependence is perceived by the low achiever who relies everything in learning on the teacher's decision. Unlike the high achiever who is able to learn independently in the absence of the teacher, the low one has to struggle with bad habits such as being lazy and cheating. The low achiever is not able to decide whether he should use much self-study materials to learn English, while the high achiever agrees she should do so. The responses from the two participants do suggest the teacher positions herself as a party with multiple roles and has significant influences on students' learning. As stated by Alonazi (2017) that language teachers should be facilitators, counselors, and resources. Being a facilitator means that teachers help learning to make it easier to happen, being a counselor means that teachers

help in identifying and solving students' difficulties in learning, and being a resource means that teachers help learners with knowledge and skills they need. Similarly, Tran and Duong (2018) found that the benefits of learner autonomy can only be felt by students if teachers provide them supportive factors, such as the teacher's autonomy-oriented role. Thus, it is not surprising that both participants agree if the failure of students is directly related to teachers' classroom employment.

Corresponding to autonomous activities students carry out, the participants' practices are totally different in terms of their learning awareness, self-efforts, self-esteem, and motivation. The high achiever's voices reflect that she involves in many autonomous activities, as can be seen in the following excerpt:

> *"My English ability is still lacking. I find a lot of difficult words in reading. To overcome this I use Google Translate to search for new words. In my free time, I also like to watch movies to enrich my vocabulary and see how people talk. I also take the initiative to speak in class, take notes, read English content on social media, and give myself rewards like going to a salon."* (Excerpt from high achievers)

Regarding their learning awareness, the high achiever is aware of her English ability and eager to cope with her English limitations. This awareness results in her high degree of self-effort such as using every opportunity to participate in activities where she can speak English, making notes and summary of lessons learned, using audio-visual materials to develop her speech, and taking risks in learning English. Her self-esteem also increases since she involves herself in various activities to improve her English, so she is able to note her strengths and weaknesses in learning. It is also found that she builds her own motivation such as buying new things due to her success or celebrating it in her own way. When interviewed, her response shows that she terribly involved herself in numerous autonomous activities. Contrary to the optimistic sound by the high achiever, the low one seems to be down beat, as indicated in the following excerpts:

> *"I can't speak English because it's difficult. I also rarely study and look for other sources. I find a lot of English content on social media, but I only read it. I don't delve into it because I feel lazy. Maybe it's my character. When it comes to assignments, I always do them because I feel sorry for my parents who are often called to school. I often cheat, especially in exams, since I find no relevance between English and my real and future life."* (Excerpt from high achiever)

It is very noticeable from the low achiever's statements that he has low motivation in English, and it influences his self-effort and self-esteem which lead to his laziness in doing autonomous activities. He is also trapped in the culture of cheating which really blocks the ability to be autonomous. Cheating culture has been a serious concern in Indonesian students' learning and exams, and it is connected with students' self-control (Ednadita et al, 2020). This issue suggests two important things: (a) self-control development should be focused more by teachers through supporting activities, and (b) attention to low achieving students and their academic dishonesty should be paid more. The neglect of the two aspects can result in students' inability in being autonomous in learning and in their real life after finishing their studies.

Another finding is that the low achiever's judgment on his own English ability, which is very low, causes him to have no intention to cover the weakness. Instead, English serves as an

enemy he avoids. As a result, he puts no effort in learning English and is not interested in learning English. From the two participants' contradictory practices, it can be seen that learners vary in terms of many aspects including motivation which will be discussed below as the challenge students encounter to be autonomous in learning.

Challenges Students Encountered

In relation to challenges students encounter in carrying out activities which support learner autonomy, the findings show different constraints faced by the two participants. As discussed previously, the low achiever expresses pessimism in learning English due to lack of motivation. Continuous bad habits including laziness and cheating have been practiced a lot during learning. Traced back, which he feels no urge to learn English, it leads to his ignorance in studying. The low achiever's excerpts above also show that he believes in the constant character he owns, indolent, causing him to not be eager in making improvement. Ekiz and Kulmetov (2016) argued that socio-functional validity is an important factor in motivation. Learning English as a foreign language may or may not be worthwhile from the student's point of view, depending on its social reality. When students perceive that they need English outside the classroom, they may be eager to learn it. However, students may find it not worth learning when they have no urge to use English outside the classroom or in their daily lives. In other words, if there is no out-of-class validity, language learning misses its functional consequences, and lack of motivation happens among students (Jafari 2013).

This issue implies that students' motivation needs to be paid great attention in addition to language knowledge. Dornyei (1997) stated that helping students to be motivated in the EFL classroom is not an easy task; it is often a difficult and complex task involving a multiplicity of psycho-sociological and linguistic factors. Despite its complexity, teachers, as one of the cores in education, cannot leave this issue from attention due to the fact that motivation contributes much to successful learning, and demotivation happens not merely due to students' internal factor, but also the learning environment (Harmer, 2007; Haynes, 1996).

One of the aspects was explained by Harmer (2007) in that poorly lit and overcrowded classrooms can be excessively demotivating because students may not study as well in uncomfortable situations as they do in more comfortable ones. Haynes (1996) added that positive school climate perceptions are important predictors that can provide students with a favorable learning environment. Students are more likely to participate in the learning process when they are in a compassionate, relaxed, and helpful learning environment. On the other hand, if the learning environment is not designed to ease students in learning such as poor lighting, unsuitable atmosphere, unpreferred order of desks, and disturbing visuals, students are easily unmotivated since those factors demotivate them.

Unlike the low achiever, motivation is not the affecting factor for the high achiever; instead, lack of learning time is the most constraints, as indicated in the following excerpts:

> *"When there are many tasks, I don't have the opportunity to learn more because it makes me very tired."* (Excerpt from high achiever)

This challenge has something to do with time-management and quantity of tasks and homework given to the students. There is no exact number of task quantities specified by curriculum, but teacher's adjustment with the students' needs is needed and the quality, other than quantity, of the assignments should be more emphasized.

Conclusion and Recommendations

In conclusion, findings of this study reflect that some different practices of learner autonomy exist among high and low achieving students. The challenges they encounter in carrying out autonomous activities are also not similar; however, both of their results point out that they expect teacher existence and existence in learning. The results disconfirm the misconceptions of learner autonomy which emphasize learning without teachers. Instead, teachers' roles are centered in developing and assisting learner autonomy. Learners should be involved in making decisions for their own learning. All activities done both in the classroom and beyond the classroom including planning and doing actions that the learners do by themselves plays a role in promoting their autonomy. It is the student who is the agent to develop, taking responsibility, and having control over their own learning.

Notwithstanding, it is important to note down that being autonomous in the classroom does not mean that teachers' role in the classroom is banned. Instead, teachers should be able to initiate and stimulate students to be autonomous, especially if the students lack autonomy. Regarding this, some activities and practices should be implemented by teachers so that teachers" roles to encourage students to be autonomous can be enhanced. Stefanou et al (2004) mentioned that there are three practices teachers can do to develop students" autonomy: organizational autonomy support, procedural autonomy support, and cognitive autonomy support. Organizational autonomy support allows students to choose the organization of the classroom. Procedural autonomy support relates to students" right to select among available resources including media and materials of learning. Cognitive support is giving students a chance to evaluate their learning including both during and after the learning process.

Acknowledgement

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Massive Open Online Course (MOOC): Instructor Student Rapport and Student Interests Among College Students of Karnataka

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Abstract

Massive Open Online Courses (MOOCs) have gained immense popularity in re-cent years, with the emergence of various platforms such as Coursera, Udacity, edX, etc. These platforms offer courses in various fields, ranging from computer science to humanities. The objective of the present study is to examine the association between student-instructor rapport and student interest while pursuing MOOCs. The sample comprised 383 college students pursuing undergraduate and postgraduate courses in Karnataka, and employed two measures, namely the Instructor-Student Rapport Scale and the Student Interest Scale. The findings of the study suggested a significant positive relationship between instructor-student rapport and student interest. Personal connection, one dimension of instructor-student rapport was found to be a significant predictor of emotional interest in students; whereas enjoyable interaction, another dimension of instructor-student rapport, was demonstrated as a significant predictor of cognitive interest. The study throws light into the scope of utilizing instructor-student rapport in enhancing student interest, thereby enhancing the efficacy of MOOCs across the country.

Keywords: MOOCs, Instructor-Student Rapport, Student Interest, College Students

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Introduction

Massive Open Online Courses (MOOCs) are online courses that offer free or affordable access to educational resources to anyone with an internet connection. MOOCs have revolutionized the way we learn and have become an essential tool for individuals, organizations, and institutions around the world. The importance and uses of MOOCs are numerous and have impacted the way we approach education and professional development. One of the most significant advantages of MOOCs is their accessibility. Anyone with an internet connection can enroll in a MOOC, regard-less of their location or financial situation (Al-Rahmi et al., 2019). MOOCs are a great way for people who cannot afford traditional education or are located in remote areas with limited access to educational resources to learn new skills and acquire knowledge (Liyanagunawardena et al., 2013). MOOCs also offer a wide range of courses on various topics, from computer science and business to language learning and creative writing. The diversity of courses available on MOOC platforms means that learners can tailor their learning to their interests and needs (Pomerol et al., 2015). This flexibility also allows individuals to learn at their own pace and on their schedule. In addition to individual learners, MOOCs have also become a valuable tool for organizations and institutions. Companies can use MOOCs to provide training and development opportunities for their employees (Park et al., 2018). MOOCs can help organizations upskill their employees and prepare them for new roles or responsibilities. Institutions such as universities and colleges can also use MOOCs to supplement their traditional classroom teaching and provide their students with additional re-sources and learning opportunities. Furthermore, MOOCs have become an essential tool for individuals looking to switch careers or acquire new skills. MOOCs can help learners develop new skills and knowledge that are in high demand in today's job market. Learners can earn certificates or credentials from MOOCs to demonstrate their skills and knowledge to employers. MOOCs also provide a platform for learners to connect with experts in their field of study. Learners can participate in online forums and discussions, ask questions, and receive feedback from peers and instructors. This collaboration and interaction with others can enhance the learning experience and provide learners with a sense of community and support (Galán et al., 2022).

Massive Open Online Courses (MOOCs) have gained immense popularity in recent years, with the emergence of various platforms such as Coursera, Udacity, edX, etc. These platforms offer courses in various fields, ranging from computer science to humanities. In India, MOOCs have also gained traction and have been used by many to enhance their skills and knowledge. A study by Venkatesh et al. investigated the perception of students toward MOOCs in India. The authors found that the majority of students found MOOCs to be beneficial for improving their knowledge and skills. However, they also noted that the completion rates of MOOCs were relatively low, which could be attributed to various factors such as lack of motivation, time constraints, and inadequate guidance (Venkatesh et al., 2003). Sahoo et al. examined the effectiveness of MOOCs in promoting lifelong learning among working professionals in India. The authors found that MOOCs were effective in enhancing the skills and knowledge of professionals, especially in the fields of computer science and engineering; MOOCs could serve as a cost-effective alternative to traditional forms of education (Sahoo et al., 2018). The availability of high-speed internet and the credibility of the platform were significant factors that influenced the adoption of MOOCs and the lack of interaction with instructors and peers, and the absence of formal recognition were some of the factors that hindered the adoption of MOOCs (Muti Altalhi, 2021).

MOOCs have been effective in enhancing the employability of graduates in India, especially in the fields of data science, artificial intelligence, and machine learning (Mohan et al., 2020). The quality of content, the credibility of the platform, and the level of interaction with instructors and peers were significant factors that influenced the satisfaction of students with MOOCs, and the lack of guidance and feedback, and the absence of formal recognition, were some of the factors that hindered the satisfaction of students with MOOCs (Nilashi et al., 2022). The Government of India has launched several initiatives to promote the use of MOOCs in the country, including SWAYAM (Study Webs of Active-Learning for Young Aspiring Minds), which is a platform for online courses offered by Indian universities and approved by the University Grants Commission (UGC). Several colleges and universities in Karnataka have also adopted MOOCs as part of their curricula, with some offering credit for the completion of these courses. The objective of the present study is to examine the association between student-instructor rapport and student interest while pursuing MOOCs.

Methodology

The study employed two measures, namely the Instructor-Student Rapport Scale & Student Interest Scale. The Instructor-Student Rapport Scale (ISRS) was developed by Brandi N. Frisby and S.A. Myers in 2008, and it consists of two dimensions, personal connection (5 items) and enjoyable interaction (6 items) (Tatum, 2019). ISRS measures the extent of the rapport between the instructor and the student in the instructional communication context. The Student Interest Scale (SIS) was developed by Joseph P. Mazer in 2012, and it consists of two dimensions, emotional interest (9 items) and cognitive interest (7 items). SIS assesses student experiences of emotional and cognitive forms of interest in instructional communication (Mazer, 2012). Both scales are measured on a 5-point rating scale. The sample comprised 383 college students pursuing undergraduate and postgraduate courses in Karnataka. More than half of the participants are females (53.5%), around three-fourths of them below 20 years of age (72.8%) and hailing from urban localities (73.6%). The majority of them study in aided colleges (52.5%) and pursue commerce and management studies (40.7%), followed by social sciences and humanities (31.6%), science (20.1 %), and other (7.6%) courses. Informed consent was taken from the participants and the measures were distributed among them for self-reporting. The obtained data was checked, edited, and coded in Microsoft Excel. Descriptive, correlation, and regression analysis (Version 23) was carried out to obtain the study results, using Statistical Package for Social Sciences (SPSS), Version 23.

Results and Discussion

Table 1: The Pearson correlation coefficient indicates a significant positive relationship between instructor-student rapport and student interest

Variable	Mean	SD	(1)	(2)	(3)	(4)
Personal Connection (1)	17.81	3.90	1	.333**	.946**	.337**
Enjoyable Interaction (2)	13.97	4.26		1	.234**	.975**
Emotional Interest (3)	26.46	6.03			1	.242**
Cognitive Interest (4)	20.10	5.57				1

**p<0.01

As demonstrated in Table 1, the Pearson correlation coefficient indicates a significant positive relationship between instructor-student rapport and student interest. The analysis

suggests that personal connection has a fairly strong correlation with emotional interest (r= .946, p <.01) whereas enjoyable interaction is strongly correlated with cognitive interest (r= .975, p <.01). To confirm this trend, a linear regression analysis was carried out, enquiring the extent to which personal connection and enjoyable interaction can predict the emotional interest and cognitive interest respectively. The findings are illustrated in Table 2 and Table 3.

Table 2: Linear regression predicting emotional interest from personal connection

Predictor	β	t	R^2	Adj. R^2	F	Sig.
Personal Connection	.946	57.02	.895	.895	3251.51	<0.001

Linear regression analysis revealed that personal connection is a significant predictor of emotional interest (β = .946, t = 57.02, p<0.00). The rise of online education has dramatically changed the way people learn and acquire knowledge. With the convenience and flexibility of online learning, more people are now turning to this alternative form of education. However, the success of online education depends not only on its convenience and accessibility but also on the emotional interest of students. Emotional interest, or the degree to which students are engaged and invested in their learning, is crucial for learning outcomes and retention. In recent years, research has shown that personal connection is a significant predictor of emotional interest in online education. Research has shown that personal connection is a significant predictor of emotional interest in online education. A study conducted by the Online Learning Consortium found that students who felt connected to their instructors and classmates had higher levels of motivation and engagement in their courses. The study also found that personal connection was a stronger predictor of emotional interest than the quality of the course content or the technology used (Gray, 2016). In conclusion, personal connection is a significant predictor of emotional interest in online education. When students feel connected to their instructors, they are more likely to be engaged, motivated, and invested in their learning. Therefore, instructors and course designers need to prioritize creating opportunities for personal connection in online education to ensure the success of their courses. By doing so, they can create a sense of community and belonging that is crucial for human motivation and well-being.

Table 3: Linear regression predicting cognitive interest from enjoyable interaction

Predictor	β	t	R^2	Adj. R^2	F	Sig.
Enjoyable Interaction	.975	86.41	.951	.951	7467.34	<0.001

Linear regression analysis also suggested that enjoyable interaction is a significant predictor of cognitive interest (β = .975, t = 86.41, p<0.00). When individuals find the learning experience enjoyable, they are more likely to become engaged and motivated to continue learning. This is particularly important in online education, where many distractions and challenges can cause learners to disengage. By focusing on creating engaging and enjoyable learning experiences, educators can increase learners' cognitive interest and ultimately improve their learning outcomes. Therefore, educators need to prioritize creating engaging and enjoyable online learning experiences that foster enjoyable interaction, as this will lead to a greater level of cognitive interest and success in online education.

Conclusion

Online education has become increasingly popular in recent years, with the number of students enrolled in online courses growing steadily. This trend has only accelerated during the pandemic, with many universities and colleges forced to shift their courses online. According to a survey conducted by BestColleges.com, 87% of students said they were interested in taking online courses. One reason for the popularity of online education is its convenience. Online courses offer students the ability to study from anywhere, at any time, as long as they have a computer and an internet connection. This flexibility is particularly appealing to students who have work or family obligations that make it difficult to attend traditional classes. Another factor contributing to the growing interest in online education is the perceived cost savings. Many online courses are less expensive than traditional courses, and students can avoid additional expenses such as commuting and housing costs. Additionally, online courses offer students the ability to complete their degrees at their own pace, allowing them to save money by taking fewer courses per semester. One of the main reasons for the growing popularity of MOOCs in India is their accessibility. MOOCs are free or low-cost, and students can access them from anywhere, at any time. This makes them particularly appealing to students who are unable to attend traditional courses due to financial or geographic constraints. Another reason for the popularity of MOOCs in India is the quality of education they offer. Many MOOCs are designed and delivered by leading universities and experts from around the world, and they offer students the opportunity to learn from the best. This is particularly important in a country like India, where access to high-quality education is often limited. MOOCs also offer students the opportunity to acquire new skills and knowledge that can help them in their careers. This is particularly important in a country like India, where there is a growing demand for skilled workers in areas such as technology, data science, and management. However, there are also challenges associated with MOOCs in India. One of the main challenges is the lack of accreditation for MOOC courses. While some universities in India are now offering credit for MOOC courses, this is still not widespread. As a result, many students may be hesitant to invest their time and money in MOOC courses that may not be recognized by employers. MOOCs have become an essential tool for individuals, organizations, and institutions looking to learn, grow and adapt in today's rapidly changing world. The accessibility, flexibility, and diversity of courses available on MOOC platforms have revolutionized the way we approach education and professional development. The importance and uses of MOOCs will only continue to grow as technology advances and the demand for life-long learning increases.

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Development of Interaction Simulation Video for Enhancing Digital Empathy Skills

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Abstract
This study applies research and development design aimed creates an interactive simulation video that enhances digital empathy skills. There are two groups of participants. First, six experts in educational technology and digital empathy content were purposively selected. Second, 48 high school students were multi-stage sampling. The research instruments were (1) the evaluation form to check the quality of the interactive simulation video and (2) the digital empathy skill test to measure students of knowledge, practical, and attitudes. The data were analyzed using a mean, standard deviation, and percentage. There are three episodes of interactive simulation video. Episode 1, "I'm not afraid true...I'm really afraid it is not," is about spreading accurate information. Episode 2, "My Areas vs. Your Areas," is about respect for rights and emotional control. Episode 3, "Fun Post…Miserable," is about posting information creatively and politely. Each episode consists of three types of interactions; overlay elements, embedded questions, and hotspots. Based on the expert's evaluation, all episodes of interactive simulation videos are quality at the highest level in all aspects (content, video media, and interaction). Episode 1 had an average of quality 4.66 (S.D. = 0.52). Episode 2 had an average of quality 4.67 (S.D. = 0.52). Episode 3 had an average of quality 4.74 (S.D. = 0.44). The score of the digital empathy skills that students took after study on the interactive simulation video was 93.11% (knowledge 90.00%, practice 96.67%, attitude 92.67%). Thus, interactive simulation videos are effective in enhancing students' digital empathy skills.

Keywords: Interaction Video, Simulation Video, Digital Empathy Skills

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Introduction

According to prior research, experiential learning is one of the best teaching methods for developing students' digital empathy skills. However, learning from real-world experience has some drawbacks. To support students in learning about digital empathy abilities and practicing how to apply those skills, the researchers embraced the concept of interactive simulation video as opposed to teaching through real-world experience. An interactive simulation video is an approach that encourages students to participate in the learning process independently while watching the video. Students are encouraged to comprehend, analyze, and reflect on circumstances that they may encounter in real life by using interactive simulation videos. Khammanee (2014) stated that adopting the simulation strategy when teaching encourages students to take on the defined learning objectives. The goal of the simulation technique is to encourage students to participate in a chosen narrative. The vignettes were based on actual circumstances that students can encounter in their daily lives online. Students made decision while watching the interactive simulation video will determine the results they experience.

The interactive simulation video is created to simulate real-world events using interactive video. The interactive simulation video's major goal is to give students a close-up experience in which they can either learn or practice new information and abilities. Using the interactive simulation video has many benefits, including motivating students to participate in their education, making it simple to monitor students' progress, and continuously assessing students' learning. The interactive simulation video also gives students rapid feedback. As a result, after each lesson, students can assess their performance and growth. Nonthaman (2018) stated that an interactive simulation video is a teaching tool that supports students' learning across all subject areas (cognitive, affective, and psychomotor abilities). The interactive simulation video will promote student motivation and deeper topic comprehension. Based on the aforementioned ideas, the research's aim was to develop an interactive simulation video for improving students' digital empathy skills.

Purpose

To develop an interactive simulation video that enhances digital empathy skills.

Methodology

Participants

There are two groups of participants. First, six experts in the field of educational technology and digital empathy content were purposively selected. All experts graduated with a doctoral degree and have experience related to designing teaching materials, interactive videos, digital intelligence, or digital empathy. Second, 48 high school students were multi-stage sampling. They are 11-grade students, both male and female.

Research Instruments

(1) An evaluation form uses to check the quality of the interactive simulation video. There are five levels of evaluation (Likert scale). The evaluation criteria are as follows (Leekitwattana, 2015):

5	means	"the most"
4	means	"a lot"
3	means	"moderate"
2	means	"few"
1	means	"minimal"

The score would be interpret as following:

The average score of 5.00 - 4.51	means	"highest quality"
The average score of 4.50 - 3.51	means	"high quality"
The average score of 3.50 - 2.51	means	"medium quality"
The average score of 2.50 - 1.51	means	"low quality"
The average score of 1.50 - 1.00	means	"least quality"

(2) The digital empathy skills test measures students of knowledge, practical skills, and attitudes. There are 24 questions. The digital empathy skills test examined the Item-Objective Congruence (IOC) by three content experts to check the validity. The experts' evaluation showed that the digital empathy skills test has content validity as the IOC comes up between 0.66 and 1.00. The difficulty of the items (p) was between 0.43 - 0.80. The discrimination power (r) was between $0.27 – 0.53$. The reliability of the whole test (KR-21) was 0.78.

Research Design

This study applies research and development design to create an interactive simulation video to enhance digital empathy skills. The researcher has the following research procedures.

Phase 1: Create an Interactive Simulation Video

1.1 Create a simulation video according to the self-learning media design plan. The self-learning media design plan has already been verified by an expert. The researcher creating a simulation video of "Thinking Before Clicking ... Digital Citizen Ethics", which consist of three episodes.

1.2 Take the finished simulation scenario video to develop it as an interaction, based on self-learning media design plan.

1.3 Bring interactive simulation video to experts to evaluate. In this regard, six experts in the field of educational technology and digital empathy evaluated the quality of the video. The evaluation form uses a five-level quality measure (Likert scales).

Phase 2: Find out the Effectiveness of the Interactive Simulation Video With 5th Grade Students Using the Achievement Assessment

2.1 Experiment with a small target group of three students by having students' study from interactive simulation video to find application problems in various areas. The researcher observes the students during the lesson and ask questions (R1).

2.2 Using the information obtained to improve the interactive simulation video (D1).

2.3 Experiment with a medium-sized target group of 15 students by allowing students to study from the interactive simulation video that adjust from experiment with small target groups (R2).

2.4 Using the information obtained to improve the interactive simulation video (D2).

2.5 Experiment with a large target group of 30 students by allowing students to study from the adjusted interactive simulation video to determine the effectiveness of the video (R3).

2.6 Using the information obtained to improve the interactive simulation video (D3).

Result

Phase 1: Create an Interactive Simulation Video

1.1 The researcher created a simulation video of "Thinking Before Clicking...Digital Citizen Ethics", which consists of three episodes:

Episode 1: "I'm not afraid true...I'm really afraid it is not" about spreading accurate and accurate information, 05.24 minutes in duration.

Episode 2: "My areas Vs your areas" about respect for rights without violating other people's privacy and emotional control when conflicting, 06.16 minutes in duration.

Episode 3: "Fun post…Miserable" about posting information creatively and using words in polite way to communicate, 07.54 minutes in duration.

1.2 Take the finished simulation scenario video to develop it as an interaction based on a self-learning media design plan. Each episode consists of three types of interactions:

1.2.1 Overlay elements interaction: To insert a summary of the essence and conclusion of the content. The overlay elements help enhance knowledge which leads to strengthening skills and attitudes.

1.2.2 Embedded questions interaction: To insert a participatory question. Embedded question increases participation and reviews the students' knowledge and understanding. The students make decisions in a situation to strengthen their skills and attitudes.

1.2.3 Hotspots interaction: To direct students to external links by having the students (a) summarize their knowledge and understanding of principles and concepts, (b) apply the situations in the video to real life, and (c) express their feeling towards the simulation events in the video.

1.3 Six experts evaluated the quality of the video, which the evaluation results are follows.

Table 1: The result of interactive simulation video on episode 1:
"I'm not afraid true...I'm really afraid it is not"

Items	Mean	S.D.	Interpret
Content	**4.70**	**0.46**	**The most**
1. The content is appropriate for the learner level	5.00	0.00	The most
2. Content accuracy	4.83	0.41	The most
3. Order of content presentation	4.50	0.84	A lot
4. Interesting content	4.50	0.55	The most
5. Appropriate of the language used in the video	4.67	0.52	The most
Video Media	**4.60**	**0.56**	**The most**
1. The sequencing is appropriate	4.33	0.82	A lot
2. The color tones are beautiful and consistent with video media	4.50	0.55	A lot
3. Voices and narrations are accurate and appropriate	4.67	0.52	The most
4. Background music sound effects are appropriate	4.83	0.41	The most
5. Media clarity	4.67	0.52	The most
Interaction	**4.67**	**0.48**	**The most**
1. The interaction style is suitable for learning style.	4.83	0.41	The most
2. Sequence and timing of each interaction is appropriate to the content	4.67	0.52	The most
3. Placement of text elements and interactive presentation graphics are appropriate	4.67	0.52	The most
4. Interesting interaction on video	4.67	0.52	The most
5. The narration and sound effects are appropriate	4.50	0.55	A lot
Overall	**4.66**	**0.51**	**The most**

Summarizes the quality of an interactive simulation video on episode 1: "I'm not afraid true...I'm really afraid it is not" by experts showing that there is a quality at the highest level in all aspects (x = 4.66). When considered individually in terms of content, video media, and interaction aspects, found to have the highest level of quality in all aspects as well.

Table 2: The result of interactive simulation video on episode 2: "My areas Vs your areas"

Items	Mean	S.D.	Interpret
Content	**4.70**	**0.48**	**The most**
1. The content is appropriate for the learner level	5.00	0.00	The most
2. Content accuracy	4.67	0.52	The most
3. Order of content presentation	4.50	0.84	A lot
4. Interesting content	4.67	0.52	The most
5. Appropriate of the language used in the video	4.67	0.52	The most
Video Media	**4.60**	**0.53**	**The most**
1. The sequencing is appropriate	4.33	0.82	A lot
2. The color tones are beautiful and consistent with video media	4.83	0.41	The most
3. Voices and narrations are accurate and appropriate	4.33	0.52	A lot
4. Background music sound effects are appropriate	4.67	0.52	The most
5. Media clarity	4.83	0.41	The most

Items	Mean	S.D.	Interpret
Interaction	**4.70**	**0.49**	**The most**
1. The interaction style is suitable for learning style.	4.67	0.52	The most
2. Sequence and timing of each interaction is appropriate to the content	4.67	0.52	The most
3. Placement of text elements and interactive presentation graphics are appropriate	4.67	0.52	The most
4. Interesting interaction on video	4.67	0.52	The most
5. The narration and sound effects are appropriate	4.83	0.41	The most
Overall	**4.67**	**0.50**	**The most**

The quality of an interactive simulation video on episode 2: "My areas vs. your areas" by experts showed that, there is quality at the highest level in all aspects (x = 4.67). When considering each side of content, video media, and interaction, it found that, there is the highest quality on all sides.

Table 3: The result of interactive simulation video on episode 3: "Fun post…Miserable"

Items	Mean	S.D.	Interpret
Content	**4.80**	**0.37**	**The most**
1. The content is appropriate for the learner level	5.00	0.00	The most
2. Content accuracy	4.67	0.52	The most
3. Order of content presentation	4.83	0.41	The most
4. Interesting content	4.67	0.52	The most
5. Appropriate of the language used in the video	4.83	0.41	The most
Video Media	**4.67**	**0.50**	**The most**
1. The sequencing is appropriate	4.67	0.52	The most
2. The color tones are beautiful and consistent with video media	4.83	0.41	The most
3. Voices and narrations are accurate and appropriate	4.50	0.55	A lot
4. Background music sound effects are appropriate	4.67	0.52	The most
5. Media clarity	4.67	0.52	The most
Interaction	**4.77**	**0.45**	**The most**
1. The interaction style is suitable for learning style.	4.83	0.41	The most
2. Sequence and timing of each interaction is appropriate to the content	4.83	0.41	The most
3. Placement of text elements and interactive presentation graphics are appropriate	4.67	0.52	The most
4. Interesting interaction on video	4.67	0.52	The most
5. The narration and sound effects are appropriate	4.83	0.41	The most
Overall	**4.75**	**0.44**	**The most**

Table 3 summarizes the quality of an interactive simulation video on episode 3: "Fun post … Miserable" by experts showing that there is quality at the highest level in all aspects (x = 4.74). When considering each side of content, video media, and interaction, there are the highest quality on all sides.

Phase 2: Find Out the Effectiveness of the Interactive Simulation Video With Students Using the Achievement Assessment.

2.1 Experiment with a small target group of three students by having students' study from interactive simulation videos to find application problems in various areas. The researcher observes the students during the lesson and interviews students about the video (R1).

2.2 Using the information obtained to improve the interactive simulation video (D1). Data analysis from observing the use of interactive simulation video and interviewing three students for various application problems. The results showed no problems.

2.3 Experiment with a medium-sized target group of 15 students by allowing students to study from the interactive simulation video that adjusts from the experiment with small target groups (R2). In order to determine the effectiveness of the interactive simulation video, students will be required to study the content through an interactive simulation video and take a digital empathy skills test after watching the video.

2.4 Using the information obtained to improve the interactive simulation video (D2). The researcher's analysis of performance values relative to the standard criteria is determined in Table 4.

Table 4: The results of the experiment were used with a medium-sized target group of 15 to determine the performance trend of interactive video scenarios.

	Knowledge	Practice	Attitude	Total
Mean	4.53	4.80	4.53	4.62
Percent	90.67	96.00	90.67	92.44

The score of the digital empathy skills test after studying the interactive simulation video was found to be 92.44%, indicating that the interactive simulation video is based on criteria compared to standard criteria.

2.5 Experiment with a large target group of 30 students by allowing students to study from the adjusted interactive simulation video to determine the effectiveness of the video (R3). In order to determine the effectiveness of interactive simulation video, students will be required to study the content through interactive simulation video and take a digital empathy skills test after studying.

2.6 Using the information obtained to improve the interactive simulation video (D3). The researcher analysis of performance values relative to the standard criteria determined as in Table 5.

Table 5: The results of the experiment were used with a large target group of 30 to determine the performance trend of interactive video scenarios.

	Knowledge	Practice	Attitude	Total
Mean	4.50	4.83	4.63	4.66
Percent	90.00	96.67	92.67	93.11

The score of the digital empathy skills test after studying the interactive simulation video was found to be 93.11%, indicating that the interactive simulation video is based on criteria

compared to standard criteria. The Office of the Basic Education Commission (2010) stated that 80% of scores interpret as a student with excellent academic performance.

Discussion and Conclusion

The results reviewed the process involved in synthesizing documents and relevant research to establish the framework for designing interactive simulation video scenarios. Subsequently, the framework was used to develop a series of three episodes of interactive simulation videos. Each episode encompassed evaluations of content, video quality, and interaction. Expert assessments indicated that every component of each episode exhibited the highest quality. Furthermore, the digital literacy skills assessment scores showed a significant improvement in digital empathy skills, reaching an average score of 93.11%. The researchers would like to discuss the following points:

1. In terms of content, the researchers have studied the problems associated with the use of social media among teenagers (Supamangmee, 2021; Puwinchana, n.d.). The most common issue identified is cyberbullying, which involves infringements on personal data, emotional control, and the spread of fake news. These findings have influenced the thematic direction, treatment, and screenplay development for each episode of the video. This process includes organizing the presentation of content in a way that captures and enhances the learners' interest and understanding. Additionally, appropriate language usage aligned with the learners' level is considered, following the principles of scriptwriting. This process involves various steps, such as providing necessary information about scenes and characters, improving the script for better comprehension, and refining the storytelling to make it concise and engaging. These efforts contribute to making the content more interesting (Sargent & Rising, 2022).

2. In terms of video quality, the assessment results indicate the highest level of quality. This outcome is a result of designing interactive simulation video scenarios that encompassed the following elements: 1) Issues, 2) Concepts, 3) Learning Outcomes, 4) Evaluation Methods, 5) Themes, 6) Treatment, 7) Interactive Flowchart Activities, and 8) Screenplay. All of these components were developed during the pre-production phase and evaluated by experts in media and educational technology, and content expertise before creating the media. After completion, the videos were further assessed by both experts and student viewers who were similar to the target audience (try-out) for further refinement. This aligns with the rational approach to the media effectiveness evaluation process, which involves conducting evaluations in stages, using a panel of experts for evaluation based on judgment, and following the production process for each medium (Wattananarong, 2014). Additionally, the videos were used with try-out groups consistent with the evaluation principles mentioned by Chaijaroen (2008), which involve comparing the media against predetermined criteria. Furthermore, the digital literacy skills assessment scores showed a significant improvement in digital empathy skills, reaching an average score of 93.11%, compared to the criteria and evaluation results set by the Basic Education Commission, Ministry of Education, which are set at 80%, indicating excellent learning outcomes (Office of Academic Affairs and Education Standards, 2010).

3. In terms of interaction, the researchers employed various interactive formats, such as overlay elements, embedded questions, and hotspots, to make them suitable for the learning style and enhance the engagement of interactive responses in the simulation videos. This corresponds to the work of Palaigeorgiou, Papadopoulou, and Kazanidis

(2018), who define interactive videos as presentations that offer response options in various formats within the video. The purpose is to promote learner participation and engagement with the presented learning content.

The research findings demonstrate that the development of interactive simulation videos is an integration of the various concepts mentioned above, blended and applied to create interactive simulation videos. Overall, each episode of the videos exhibited the highest level of quality. Additionally, the results from using the interactive simulation videos showed their effectiveness in enhancing knowledge, skills, and attitudes related to ethical digital technology usage among learners.

Acknowledgment

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Analysis of Gender Difference of Factors Affecting Academic Performance of Mathematics Doctoral Students

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Abstract

This study aimed to investigate the gender differences in the factors affecting the academic performance of mathematics doctoral students. A total of 147 participants were surveyed using a questionnaire that included items such as fear of delay, doctoral student engagement, support from parents and teachers, facilitating conditions, stress levels, and well-being. this study aimed to investigate the impact of various factors on the academic performance of mathematics doctoral students and whether there were any gender differences in these factors. Structural equation modeling (SEM) and Multiple group analysis approach were adopted to analyze the questionnaire data. The results showed that the fear of being delayed did not have a significant impact on the academic performance of doctoral students in mathematics, but it did heighten their stress levels. The level of engagement of students had a positive impact on their academic performance, and teacher support had a significant impact on academic performance, particularly for male students. However, there were no significant gender differences in the factors affecting academic performance. These findings suggest the importance of creating a supportive environment and promoting student engagement to enhance academic performance. The study's findings also have practical implications for institutions, supervisors, and parents seeking to enhance the academic performance of different-gender doctoral students.

Keywords: Academic Performance, Mathematics Ph.D. Students, SEM

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Introduction: Analysis of Gender Difference of Factors Affecting Academic Performance of Mathematics Doctoral Students

The OECD reported in 2015 that women made up almost half of all doctoral students in their jurisdiction. While the number of female doctorate recipients has been increasing, the field of mathematics remains an exception to this trend (Su & Rounds, 2015). It has been historically believed that gender differences in math Ph.D. participation and achievement were due to differences in ability or interest (Charles, 2011). However, research in the US and Sweden has shown no differences in math performance between boys and girls in primary, middle, and high school (Brandell et al., 2007). This conclusion was also supported by a meta-analysis of international assessments in math. Despite this parity in performance, there is still a significant gender gap in female participation in Ph.D. studies and beyond, leading to the so-called "leaky pipeline" phenomenon (Else-Quest et al., 2010; Moss-Racusin et al., 2012).

It is extremely difficult to attain academic achievement in doctoral studies, resulting in a significant number of dropouts and low satisfaction levels among students pursuing a doctorate degree (Zhang et al., 2022). So, there is many research focusing on digging deeper on doctoral students' academic performance. Most previous studies measured students' academic performance in terms of the number of high-quality publications and the time to complete the Ph.D. program (Ceci et al., 2009). Few studies have used process evaluation to assess student academic performance. Comparative studies have shown an increase in doctoral education in East Asia, as reported by Shin and his colleagues (2018). However, these studies have mainly focused on developed countries and have not given much attention to developing countries. So, It is important to identify gender-based differences in factors that affect the performance of mathematics Ph.D. students in order to offer improved assistance or aid for postgraduate students in other East Asian settings.

Literature Review

There are many research explained gender-based performance differences in Ph.D. students (Brandell et al., 2007; Heffron et al., 2021; Wan Chik et al., 2012). Most previous studies measured students' academic performance in terms of the number of high-quality publications and the time to complete the Ph.D. program. Fisher and his team found that the women included in their study finished their Ph.D. training approximately six months later than their male peers and published about one paper less during their doctoral studies. It also has been observed that males have a higher probability of completing their studies compared to females (Strayhorn, 2005; Wao & Onwuegbuzie, 2011).

However, Previous studies have not fully considered the intricacies of attaining a postgraduate degree when examining the factors that facilitate the success of doctoral students. Bagaka and colleagues (2015) have argued that the "All But Dissertation" approach undermines the true objectives of successful doctoral programs, which should prioritize factors such as mastery of material, commitment to excellence, writing and communication skills, study skills, knowledge of professional literature, and critical thinking abilities.

Other research has also suggested that women's academic performance can differ significantly depending on the field of research (Ceci et al., 2009; Su & Rounds, 2015). While previous reports have focused on doctoral students from different fields, such as kinesiology (Young et al., 2019), STEM (Fisher et al., 2020), communication (Carpenter et

al., 2015), and education (Spaulding & Rockinson-Szapkiw, 2012). There is still limited literature on mathematics postgraduates.

In conclusion, the objective of this research is to investigate and identify whether there is gender difference that impact the academic progress of doctoral students in mathematics. A survey was conducted on 147 postgraduate students from Indonesia, and a range of quantitative analysis methods were utilized, including structural equation modeling.

Theoretical Background

Doctoral Academic Performance Indicators

Researchers in the field of higher education have made numerous efforts to examine the academic performance of doctoral students. Recent studies have focused on different indicators of success, such as attrition rates (Castelló et al., 2017; Leijen et al., 2016), retention rates (Ames et al., 2018), completion rates (Bekova, 2021), and on-time graduation (Ndayambaje, 2018). Although these indicators are reasonable, some scholars (Bagaka et al., 2015) have argued that success in doctoral education should also focus on the competencies of postgraduates as scholars, their knowledge of specific areas, and their personal abilities. The definition of academic success at the doctoral level varies across different subjects, and a comprehensive definition of doctoral success is highlighted as a combination of internal and external factors.

To provide a comprehensive assessment of doctoral students' academic performance, multiple indicators are prioritized instead of solely relying on degree completion rates. According to Olehnovice's (2015) theories, academic competence can be divided into three categories:

F1: Informative competencies: determine structure, content, and strategy of experiments or research.

F2: Communicative competencies: the ability to collaborate and participate in the academic environment, both locally and globally.

F3: Instrumental competencies: determine the appropriate procedures and patterns of interpretation for data.

Factors Affect Ph.D. Student Academic Performance

Numerous prior reports have investigated various factors that influence academic success of postgraduate students, highlighting the complex core of doctoral studies (Leijen et al., 2016) Wollast et al., 2018). Leijen and colleagues (2016) identified three categories of factors that contribute to doctoral students' progress, including personal characteristics, supervisory arrangements, and the broader learning community. Castelló et al. (2017) also examined institutional and personal variables that affect doctoral students' dropout rates. Despite the importance of institutional support, family support was found to be a significant source of social support, particularly in East Asian countries where students have high levels of family support and comfort (Choi & Nieminen, 2013). In this study, the model focuses on various predictors that have been derived from previous theories, such as fear of delay, doctoral student engagement, support from parents and teachers, facilitating conditions, stress levels, and well-being. It is anticipated that these factors will have an effect on the academic achievement of mathematics doctoral students, and they are discussed in detail in the following paragraphs.

Student Engagement

Student engagement refers to the level of investment a student makes in their education, including time, energy, and cognitive efforts. The concept is broken down into: behavioral, cognitive, and emotional three perspectives. It is a crucial aspect that impacts a student's learning outcomes, grades, and accomplishments. At the K-12 level, student engagement is closely tied to academic success and educational abilities (Shuck & Reio Jr, 2014). In this study focused on mathematics doctoral students, engagement is defined as their ability to read literature, seek opportunities, collaborate with peers, create learning tools, discuss with mentors, conduct research, and publish results. Higher levels of engagement in these activities are believed to reduce stress and directly impact academic performance.

Parental Support

Previous studies (Mata et al., 2018) have consistently shown that parental support is strongly linked to student academic achievement and is a crucial factor in shaping their learning success. This type of support can impact a student's motivation to learn, attendance, and overall behavioral attitudes. It can be divided into two categories: academic and emotional support. Dityawati's meta-analysis (2019), revealed that receiving support from parents had a notable and favorable impact on the academic accomplishment of students. However, another study suggested that helping with homework and assisting with learning did not have a significant impact on educational abilities (Wu, 2001). Therefore, it appears that parental support does not always have a significant influence on a student's learning progress. The present research, which centers on mathematics doctoral students, hypothesizes that parental support will effectively decrease stress levels and enhance academic achievement.

Facilitating Conditions

Facilitating conditions are the circumstances that enable students to pursue a graduate degree and have access to individuals who can assist them in resolving academic issues. To improve the academic skills of these students, educational institutions should provide a variety of amenities, such as workshops and training sessions. Previous research (Wijaya et al., 2022) has indicated that facilitating conditions can indirectly impact student academic achievement during a pandemic by influencing their behavior. For this study, it is predicted that facilitating conditions will have a positive effect on well-being and improve their academic performance.

Teacher Support

Parental and teacher support are critical factors in determining students' abilities. Prior research conducted by Mata's team (2018) explored the correlation between teacher support and academic success among students in elementary and secondary schools. In this particular study, teacher support refers to the suitable guidance given by mentors and professors to all postgraduate mathematics students. Since collaboration skills are essential in the 21st century, teacher support can also motivate doctoral students to work with professionals or peers, leading to significant improvements in their academic performance through mutual learning. Our hypothesis suggests that teacher support will have a constructive and noteworthy effect on the academic accomplishment and overall welfare of mathematics doctoral students.

Student Well-Being

Student well-being is a critical factor that affects various aspects of the academic world, including learning abilities, engagement, achievement, and teamwork capability (Ansong et al., 2020). It is important for educators to understand that student well-being significantly influences academic achievement (Mehta, 2011). In addition to preventing students from exhibiting problems such as stress and frustration, well-being also helps them grow and learn from educational challenges. The term "well-being" in this context is defined as the ability and resources to regulate emotions effectively and maintain a constructive and optimistic attitude while engaging in the learning process. Some institutional policymakers place a strong emphasis on student well-being during classroom learning, believing that students can only achieve maximum academic performance when they are educationally satisfied and supported (Pietarinen et al., 2014). This study predicts that facilitating conditions and teacher support on campus will influence student well-being and that it will be significantly and positively associated with the academic performance of mathematics doctoral students.

Stress Level

Stress has a great impact on a person's psychology (Salanova et al., 2010). Studies (Wang et al., 2021; Westphal et al., 2022) have explored the relationship between stress and academic performance due to its effect on students' health. Surprisingly, this study found that stress is rarely beneficial for individuals, which is consistent with existing literature (Abdullah et al., 2022; S. Liu & Onwuegbuzie, 2012). While stress can sometimes motivate people to learn more and improve their abilities, it can also have negative consequences on their overall well-being.

However, stress can also improve coping strategies that may be useful in solving other problems in the future. Despite this, the present study predicts that stress levels will significantly reduce the academic performance of mathematics postgraduates. Parent support and student engagement are predicted to reduce stress levels for doctoral students.

Based on the literature review, 14 initial hypotheses containing 5 independent, 2 intermediate, and 1 dependent variable are shown in Figure 1. Based on analysis above, this research tends to explore how do these factors impact the academic performance of male and female Ph.D. students and gender difference of factors affecting academic performance of mathematics doctoral students.

Figure 1: A Proposed Framework for Factors Affecting Mathematics
Doctoral Student's Academic Performance
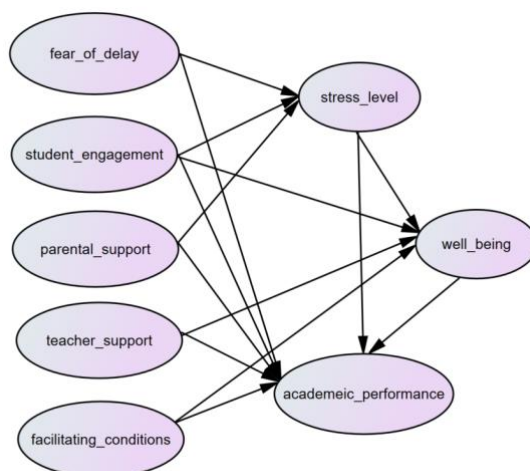
Methodology

Participants

There are 147 Indonesian mathematic doctoral students engaged in this study. The study informed consent from study participants. All the participants were provided with complete information regarding the study's objectives, methodologies, potential advantages, and risks, and they were given the chance to ask any questions and opt-out of the study at any given time. Table 1 provides detailed data of the participants.

Table 1: Demographic Respondents' Data

Demographics		N	Percentage
Gender	Male	59	40.14%
	Female	88	59.86%
Age	20–24 years old	41	27.89%
	25–29 years old	86	58.50%
	30 years old and above	20	13.61%
Academic year	First	23	15.65%
	Second	41	27.89%
	Third	52	35.37%
	Fourth year above	31	21.08%
Marital status	Married	91	61.90%
	Not yet Married	56	38.10%
Job status	Not Yet Working	119	80.95%
	Already Working	28	19.05%

Data Collection Tool and Procedure

Using Google Docs, a set of online questionnaires was created. The questionnaires was designed based on the literature review, which had a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). All of the questionnaire items were taken from previous reports and were modified to fit the context of this study, ensuring that the questionnaire had good validity and reliability.

The questionnaire was reviewed by three professors before it was distributed to participants from August to September 2022. The questionnaire was randomly distributed through email, WhatsApp groups, and university professors. Participants were not compelled to fill out the questionnaire and were not required to provide their names, which ensured the anonymity of the data. The information obtained from the questionnaire was kept for study purposes only and was not disseminated. It took an average of 9 minutes to fill out the questionnaire.

The questionnaire used in this study had two parts. The first part collected basic information about the doctoral students, such as their gender, age, and academic year. The second part consisted of 27 measurement items that were taken from previous reports and focused on various factors including fear of delay, engagement, parental and teacher support, facilitating conditions, stress level, well-being, and academic performances.

Data Analysis

The data obtained were processed and analyzed using SPSS 23 and AMOS 26, Firstly, the data were initially assessed and sorted, with the descriptions of the participants carried out through SPSS 23. The subsequent phase of the study focused on analyzing the measurement model to verify its reliability and validity, with a particular emphasis on the Composite Reliability (CR), as well as the factor loading and AVE estimations. Furthermore, AMOS was used to apply structural equation modelling (SEM) which was more suitable for explaining the difference between gender difference of factors affecting academic performance. This study also examined the measurement invariance of the scale in male and female groups. The measurement invariance includes four aspects of invariance: configural invariance, metric invariance, scalar invariance, and strict invariance. When evaluating the measurement invariance, if the change in the RMSEA index is less than 0.01, it is considered as passing the measurement invariance test. So, we can say that the results (Table 2) of the measurement invariance test showed an acceptable result.

Table 2: Measurement Invariance Result

Model	χ^2	df	CFI	RMSEA	Model Compare	$\Delta\chi^2$	Δdf	p	ΔRMSEA
M1: Configural invariance	2487.42	866	0.63	0.16					
M2: Metric invariance	2635.76	928	0.61	0.16	M2−M1	147.94	62	< .001	−0.001
M3: Scalar invariance	2686.96	951	0.60	0.16	M3−M2	51.60	23	< .001	-0.001
M4: Strict invariance	2787.71	985	0.59	0.16	M4−M3	100.75	34	< .001	-0.001

Validity

The CMIN/DF value is 2.82 < 3, which indicates an acceptable fit (Kline, 1998). Comparative Fit Index also shows a very good fit (close to 1), (Hu & Bentler, 1999). (See Table 3 and Table 4).

Table 3: CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	121	1145.89	406	0	2.82
Saturated model	527	0	0		
Independent model	62	280	465	0	6.88

Table 4: Comparative Fit Index

Model	NFI	RFI	IFI	TLI	CFI
Default model	0.642	0.59	0.74	0.69	0.73
Saturated model	1.00		1.00		1.00
Independent model	0.00	0.00	0.00	0.00	0.00

Analysis Measurement Model

Validity was tested by observing the value of factor loadings This was accompanied by the values of AVE and CR, which should be greater than 0.50 and 0.70 respectively. We can see that except for facilitating condition (0.434) and engagement (0.456), other factors have acceptable AVE value. Besides, the Composite Reliability exceeded the 0.70 limitation. Detailed results of analysis are provided in Table 5.

Table 5: Standardized Regression Weights

Indicator			Std. Estimate	AVE	CR
STRESS1	<---	Stress	0.822		
STRESS2	<---	Stress	0.908		
STRESS3	<---	Stress	0.798	0.523	0.837
STRESS4	<---	Stress	0.529		
STRESS5	<---	Stress	0.447		
WELL BEING1	<---	Well-being	0.678		
WELL BEING2	<---	Well-being	0.683	0.586	0.849
WELL BEING3	<---	Well-being	0.856		
WELL BEING4	<---	Well-being	0.828		
Facilitating Condition1	<---	Facilitacting-conditions	0.631		
Facilitating Condition2	<---	Facilitacting-conditions	0.550	0.434	0.700
Facilitating Condition3	<---	Facilitacting-conditions	0.550		
PARENTS1	<---	parents'support	0.312		
PARENTS2	<---	parents'support	0.872	0.620	0.807
PARENTS3	<---	parents'support	1.001		
FEARPOST1	<---	Fear of postpone	0.792	0.578	0.732
FEARPOST2	<---	Fear of postpone	0.728		

ACAPER1	<---	Academic performance	0.609		
ACAPER2	<---	Academic performance	0.806		
ACAPER3	<---	Academic performance	0.690	0.563	0.810
ACAPER4	<---	Academic performance	0.589		
ACAPER5	<---	Academic performance	0.686		
Teacher support1	<---	Teacher support	0.796		
Teacher support2	<---	Teacher support	0.720		
Teacher support 3	<---	Teacher support	0.838	0.586	0.876
Teacher support 4	<---	Teacher support	0.737		
Teacher support 5	<---	Teacher support	0.731		
ENGAGEMENT1	<---	Student Engagements	0.728		
ENGAGEMENT2	<---	Student Engagements	0.681	0.456	0.765
ENGAGEMENT3	<---	Student Engagements	0.778		
ENGAGEMENT4	<---	Student Engagements	0.477		

Result

Multiple group analysis in AMOS is a powerful tool for comparing models across different groups and identifying any differences that may exist (Byrne, 2016). So multiple group analysis was used to identify the differences between different genders. From Table 5, we can see that $P > .05$, indicating that the model is not significantly different on different gender groups.

Table 6: Multiple group analysis

Model	DF	CMIN	P	NFI	IFI	RFI	TLI
Structural weights	12	2.636	0.056	-0.004	-0.005	-0.004	-0.005

Figure 2 and 3 show the result of structural model of male and female. Table 7 and 8 show the results of regression weights of male and female, $p<.05$ means that the path is significant, and in the case of a significant path, a positive coefficient means that the independent variable has a significant positive effect on the dependent variable, and a negative coefficient means that the independent variable has a significant negative effect on the dependent variable.

Table 7: Result of male

			Estimate	S.E.	C.R.	P
Stress	<---	Fear of postpone	0.467	0.49	4.541	***
Stress	<---	Student Engagements	-0.132	-0.088	-0.837	0.403
Stress	<---	Parent support	-0.227	-0.144	-1.201	0.23
Wellbeing	<---	Teacher support	0.01	0.011	0.077	0.938
Wellbeing	<---	Facilitating conditions	1.046	0.955	5.668	***

Academic performance	<---	Fear of postpone	-0.058	-0.085	-0.939	0.348
Academic performance	<---	Student Engagements	1.251	1.163	3.03	0.002
Academic performance	<---	Parents support	-0.06	-0.053	-0.522	0.601
Academic performance	<---	Teacher support	0.521	0.512	2.26	0.024
Academic performance	<---	Facilitating conditions	-1.806	-1.388	-2.872	0.004
Academic performance	<---	Wellbeing	0.955	0.804	2.736	0.006
Academic performance	<---	Stress	-0.011	-0.015	-0.305	0.761

Table 8: Result of female

			Estimate	S.E.	C.R.	P
Stress	<---	Fear of postpone	0.542	0.103	4.541	***
Stress	<---	Student Engagements	-0.069	0.158	-0.837	0.403
Stress	<---	Parents support	-0.096	0.189	-1.201	0.23
Wellbeing	<---	Teacher support	0.007	0.124	0.077	0.938
Wellbeing	<---	Facilitacting conditions	0.867	0.185	5.668	***
Academic performance	<---	Fear of postpone	-0.132	0.061	-0.939	0.348
Academic performance	<---	Student Engagements	1.288	0.413	3.03	0.002
Academic performance	<---	Parents support	-0.05	0.115	-0.522	0.601
Academic performance	<---	Teacher support	0.499	0.231	2.26	0.024
Academic performance	<---	Facilitating conditions	-1.974	0.629	-2.872	0.004

| Academic performance | <--- | Wellbeing | 1.259 | 0.349 | 2.736 | 0.006 |
| Academic performance | <--- | Stress | -0.022 | 0.036 | -0.305 | 0.761 |

Through the comparison of the two results, for the factor stress, only fear of postpone had a significant effect on stress (p < .001), and the effect of fear of postpone on women's perceived stress was greater than the effect on men's (0.542 > 0.467), student engagement and parental support had no significant influence on stress. It seems like men's stress is more likely to be influenced by parental support. In terms of well-being, only facilitating conditions had a significant effect ($p < .001$). There was almost no difference between male and female in terms of the effect of teacher support on well-being.

In terms of the dependent variable of academic performance, student engagement, teacher support, facilitating conditions, and well-being have a significant impact on academic performance. Among them, facilitating conditions have a negative impact on academic performance, while the others have a positive impact. Student engagement, facilitating conditions, and well-being have a greater impact on female academic performance than on male academic performance, while teacher support has a greater impact on male academic performance.

Figure 2: Structural Model Evaluation Result for Male
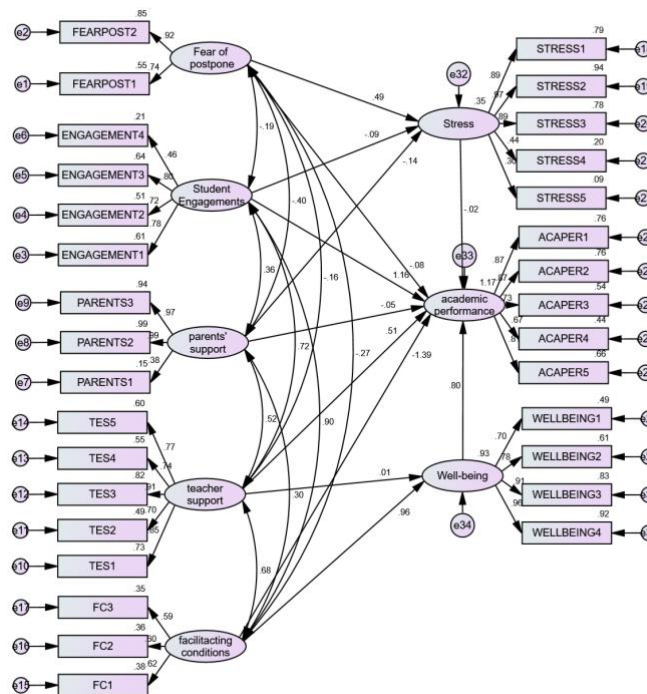
Figure 3: Structural Model Evaluation Result for Female
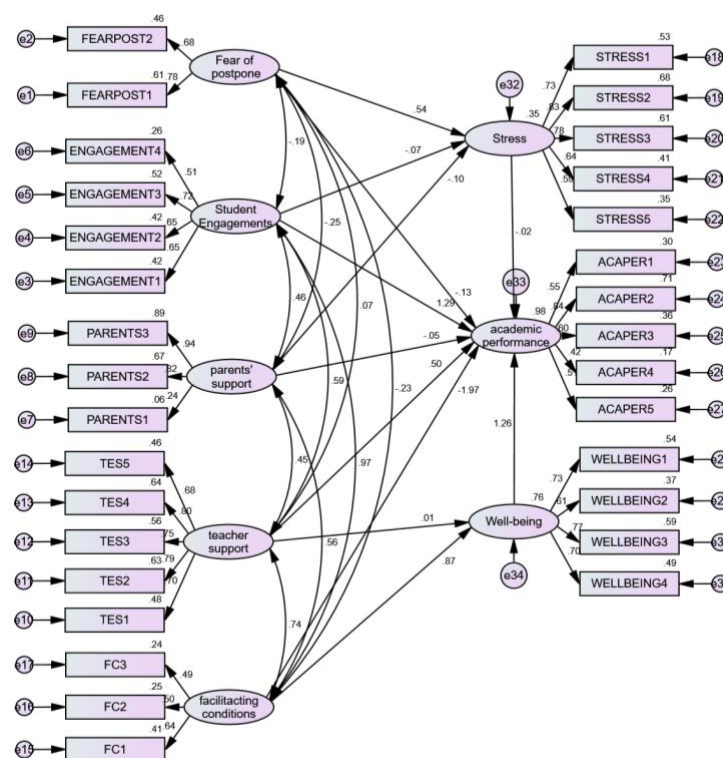
Discussion

Our research indicated that the fear of being delayed could heighten the stress levels of doctoral students in mathematics, but it did not have a significant impact on their academic performance. This finding contradicts previous studies that demonstrated how fear of failure and stress can motivate individuals to achieve their goals effectively (Liu et al., 2022; Putwain & Symes, 2011). Daniel (2020) suggested that anxiety levels increase when individuals experience fear, and this often drives them to perform better.

The result emphasizes that the academic performance of doctoral students in mathematics was positively impacted by their level of engagement. Those who were highly engaged had a better perception of their academic achievements. This finding is consistent with previous research that suggests students who are more passionate about their education tend to perform better academically (Gopal et al., 2018; Kossen & Ooi, 2021).

The significant impact of teacher support on academic performance has been found in this study which is consistent with previous studies (Davidson et al., 2021). Furthermore, the conclusion of teacher support has a greater impact on males is also consistent with previous research (Fisher et al., 2020), which surveyed 227 alumni of STEM Ph.D. programs in 17 African countries and found that supervision had a stronger impact on men than women.

Our study found no significant difference between factors affecting males and females, which is consistent with previous research results (Seagram et al., 1998; Sheridan & Pyke, 1994; Wilson & Reschly, 1995). The academic environment and expectations for both genders are relatively similar at the doctoral level. However, some studies have found that female academic performance is worse than that of males, as evidenced by the fact that women take

longer to complete their doctoral-level requirements. If this is the case, it may be due, in part, to the accumulated microinequities that women experience as graduate students. Many authors have pointed out that the nature and quality of graduate education is not equivalent for men and women (Ceci et al., 2009; Feldon et al., 2017).

Conclusions

About the first research question, how do these factors impact the academic performance of male and female Ph.D. students. Our research found that the fear of being delayed did not have a significant impact on the academic performance of doctoral students in mathematics, but it did heighten their stress levels. The level of engagement of students had a positive impact on their academic performance, and teacher support had a significant impact on academic performance, particularly for male students. These findings suggest that universities and educators should prioritize creating a supportive environment for students and promoting student engagement to enhance academic performance.

About second research question, gender difference of factors affecting academic performance of mathematics doctoral students. our research found no significant difference between factors affecting males and females in doctoral-level mathematics. These findings suggest the importance of creating a supportive environment and promoting student engagement to enhance academic performance, regardless of gender.

Implication

The study's findings have practical implications for institutions, supervisors, and parents seeking to enhance the academic performance of doctoral students. The results indicate that the success of these students is closely linked to the involvement of parents, lecturers, and the students themselves. Therefore, these stakeholders must collaborate to reduce stress levels, promote well-being, and support doctoral students' academic progress. Institutions should develop programs that prioritize the well-being of doctoral students, encouraging them to view earning a doctoral degree as a worthwhile pursuit. Faculty members and supervisors should consider implementing strategies to improve students' engagement and well-being.

Limitation

First, our sample size was not large enough. Furthermore, it is probable that any disparities between genders are not connected to the elements we investigated in our study, but rather to external factors like societal and cultural influences. Our findings suggest that gender may not be a significant predictor of academic achievement in doctoral-level mathematics, but more research is necessary to comprehend the intricate interplay of factors that contribute to gender disparities in graduate education. Potential future studies could delve into other factors, such as mentoring, career goals, and work-life balance, and explore how they interact with gender and other demographic variables. This research could inform policies and practices that promote gender equality and diversity in mathematics doctoral education and beyond.

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Implementation of 5S Lean Methodology in Reviewing Competencies in a Higher Education Institution

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Abstract

The potential of applying Lean Management in Higher Education Institutions has increased significantly in last few years leading to tremendous savings. Reviewing and updating competencies' curriculum matrix is one of the critical and complicated processes that consume time and effort. Consequently, there has been a quest for a scientific and sustainable approach to effectively manage this review. This paper presents a novel approach of implementing Lean (5S) methodology in reviewing technical competencies required for the graduates of the Military Technological College in the Sultanate of Oman. The 5S framework has been imbedded into an action plan using the PDCA (Plan, Do, Check, and Act) Deming's cycle. As a result, the method applied has helped in sorting out the actual required competencies, the team has identified the required (new, amended, and deleted) competencies in all of the targeted Engineering Departments, in addition, the major wastes within the overall process were identified and the future review process was standardised and documented.

Keywords: Kaizen, SDCA, PDCA, 5S, Lean, MTC, Competencies, Curriculum Matrix, Higher Education

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Introduction

The sophistication of equipment and machine learning technology has accelerated the global economic race competition. In forthcoming era, leading edge organisations will be forced to give the preference in recruitment to the specialised hands-on skills personnel. Therefore, vocational competencies based on updated required skills and knowledge are going to play major role in achieving the required students' attributes of Higher Education (HE) institutions.

Military Technological College (MTC) – Oman has taken a step further as a leading organisation in this field. It delivers academical technical and vocational competencies needed by graduates using three integrated approaches (i.e., academic programmes, Training Needs Analysis (TNA) programmes, and integration of the TNA programmes with the academic programmes) [1]. This has led to have a very complicated competencies' curriculum matrix mapping for MTC engineering departments, that obviously triggered searching for a scientific and sustainable approach to manage such a review process.

Overview and Review Scope

MTC has been established to become a Centre of excellence through its substantial provision of education and training for Ministry of Defense (MoD) and civilian technicians and engineers in the Sultanate of Oman. The College aims to become amongst the best in the filed of military and applied non-military technical education and training. This has driven its mission as the place of delivering vocational trade, specialists, undergraduate and postgraduate engineering programs in a high quality learning and training environment [1].

The college comprises of five engineering departments, namely Systems, Aeronautical, Marine, Civil and Quantity Survey, and Geomatics. The Geomatics department is a recent addition that has not been considered during the implementation stage of this study. In the course of the review process, the number of competencies taken into account is as follows: 371 for Systems Engineering, 54 for Aeronautical Engineering, 111 for Marine Engineering, and 78 for Civil and Quantity Survey Engineering [4].

The plan was to develop a review process aimed at a comprehensive review of competency descriptors' documents, focusing specifically on the following sections: elements and performance criteria, required skills and knowledge, resources required to demonstrate the competencies, and the assessment strategies. However, the process was intentionally designed to be flexible, allowing for the removal of existing competencies or the addition of new ones in response to changes in technology and stakeholder requirements.

Methodology

Lean is a management philosophy and methodology that originated in manufacturing sector but has since been applied across various industries. It is centered on the concept of maximising customer value while minimising waste [5]. In essence, lean thinking seeks to optimise processes by eliminating unnecessary steps and increasing processes efficiencies [3]. Research indicates that the initial implementation of Lean management in higher education occurred in 2003 [2].

Numerous tools and techniques are available within the realm of Lean methodology (e.g., value stream mapping, value engineering, kanban, etc.). In the context of this study, a strategic choice has been made to incorporate the 5S housekeeping Lean tool. This Japanese tool utilize five keywords, all beginning with the letter S, as its basis. Sort (Seiri), Set in order (Seiton), Shine (Seiso), Standardise (Seiketsu), and Sustain (Shitsuke), and it has been seamlessly integrated into a PDCA (Plan-Do-Check-Act) Deming cycle using Kaizen mode (i.e., starting the first cycle with Standardise instead of Plan); Figure 1 shows Cycle-1 TNA5S review conceptual model. This deliberate integration aims to enhance the efficiency and effectiveness of the review process mechanism by systematically addressing and improving the competencies descriptors elements described earlier through clear documentation and well-established accessibility of the required information from different stakeholders.
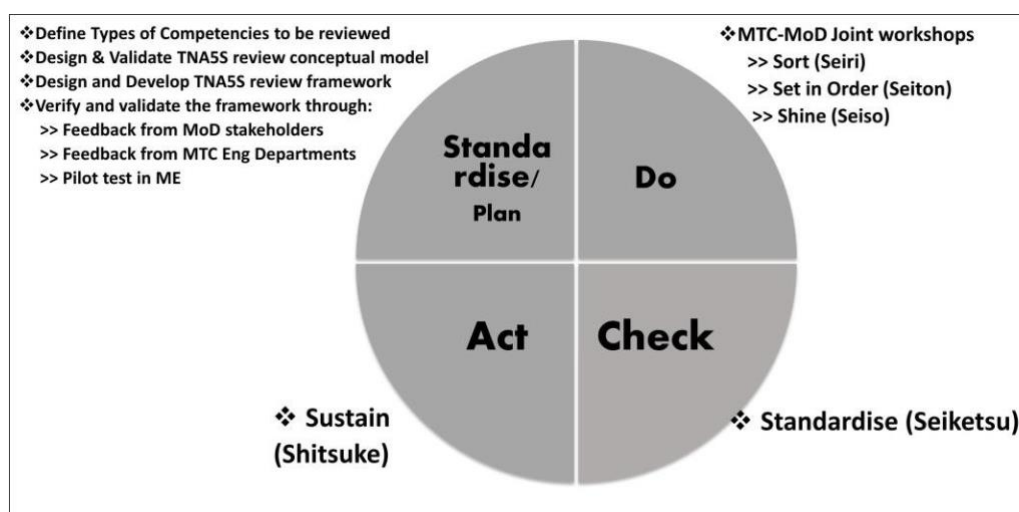
Figure 1: Cycle-1 TNA5S review conceptual model.

During *Standardise* step of Cycle-1 of the TNA5S review conceptual model, types of competencies to be reviewed were defined. The designed model underwent validation by a Lean practitioner, ensuring its conformity to Lean principles. The TNA5S review framework was then meticulously developed and successfully underwent a verification and validation process, necessitating only minor adjustments. A pilot test was conducted in coordination with Marine Engineering department.

In the subsequent *Do* phase, a comprehensive plan was developed and executed in a collaborative workshops forum involving all stakeholders (i.e., MoD specialists, MTC engineering departments' concern lecturers and instructors, and random selected participants from MTC graduates). The primary objective was to delineate vocational competencies from other types (*Sort*). The *Set in Order* aspect was employed to categories mandatory competencies separately from complementary ones which will systematically impact the proficiency levels students must attain before graduation. The process concluded with removing unnecessary elements, conducting proofreading, and updating the documents (*Shine*).

Following the *Do* phase, efforts were directed towards ensuring the planned implementations were executed as intended. This included confirming that competency descriptors for all Engineering departments adhered to a unified format and complied with established policies

and regulations (*Standerdise*). The final task involved obtaining Check/evaluation approval, as a prerequisite to progress to the subsequent step.

In the *Act* phase, insights and lessons gleaned from the process were comprehensively discussed and documented. These insights are instrumental in refining the Plan step for the next cycle of the review (*Sustain*), as illustrated in Figure 2.
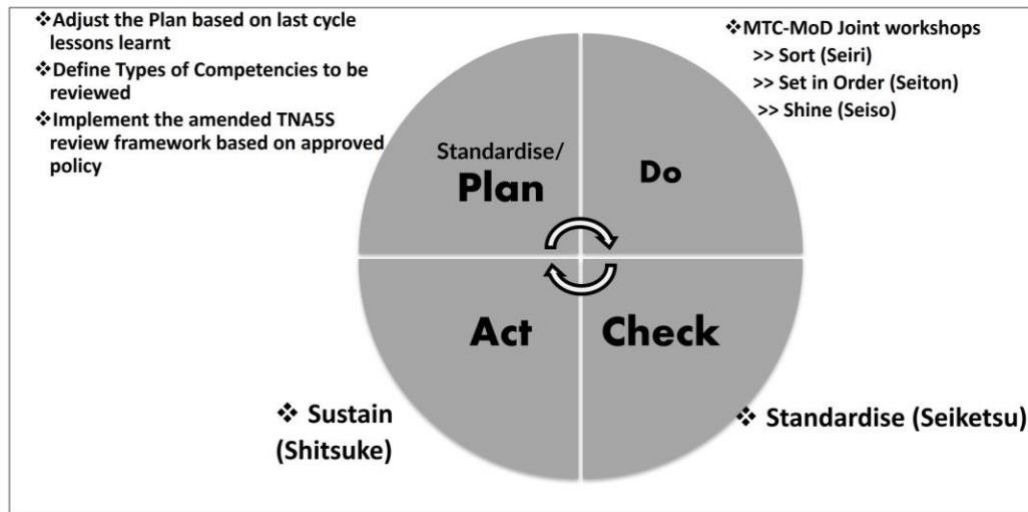
Figure 2 Cycle-2 TNA5S review conceptual model.

Findings

Despite the fact that the implementation of the new review mechanism has resulted in enhanced efficiency and effectiveness of the overall process and significant reduction in review lead time, Figure 3 highlighted the comprehensive review findings pertaining to incorporated new (22 competencies), modified (173 competencies), and deleted (2 competencies) descriptors.
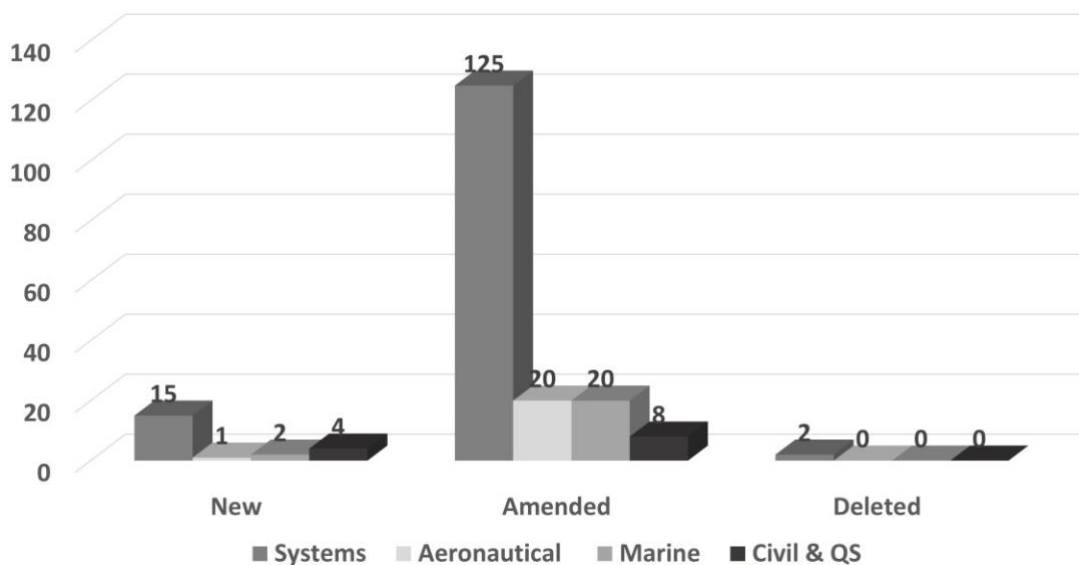
Figure 3: TNA5S Competencies Review Findings.

During the review process, three primary forms of waste were identified. Firstly, overproduction manifested as departments repeatedly generating amendments to competency descriptors, leading to the creation of multiple versions. Secondly, overprocessing was evident in the unnecessary inclusion of elements in competency descriptors documents. Lastly, waiting times were notable, primarily stemming from extended periods required for peer review and consultation with stakeholders.

Conclusion

In conclusion, the effective implementation of the TNA5S review conceptual model and framework demonstrates its success in streamlining competency review process. This achievement proves the adaptability of Lean principles in higher education, showcasing their potential to eliminate waste and enhance efficiency. The key takeaway lies in the commitment to sustain Lean practices, emphasising ongoing dedication as a critical factor for success. This accomplishment marks a significant step toward reshaping educational processes and promoting continuous improvement in higher education.

Acknowledgment

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EFL Students' Perceptions of the Use of Higher Order Thinking Skills in English Language Writing: Indonesian Students' Contexts

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Abstract

Higher Order Thinking Skills (HOTS) is inevitably important to develop students' critical and creative thinking skills in 21st century era. HOT skills are the cognitive ability to analyze, evaluate, and create some topic inside or outside the classroom. This case study was conducted to explore the impact of using HOT skills and investigate student's perception towards its use in EFL writing classrooms. This study involved three students in the third grade in junior high school. They were asked to independently write recount texts with similar theme. Students' worksheet and interviews are conducted and then analyzed by using Bloom's taxonomy. The findings eventually show that that stage "analyze" mostly appears in written form and the students felt actively involved in learning activities, developed their writing skills, and experienced learner autonomy and problem-solving abilities. The study recommends that HOT skills have a positive result for EFL students and be explicitly infused in the teaching and learning of writing activities in EFL classrooms.

Keywords: EFL Students, Higher Order Thinking Skills, Writing Classroom

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Introduction

Inevitable prompt growth in the 21st century influences almost every aspect of human life (Assare, Mohammadi, Forutan, & Salehizadeh, 2016) and there is no exception for the education aspect. Much improved competencies and skills are needed to equip students of any level of education in today's globalization and disruption era (Huang et al., 2010). The fundamental aspect is Higher-order thinking skills. As they are known, they needed education to meet the demands of the twenty-first century. many specialists have noted the connection between students' academic success and higher-order thinking capabilities (HOTS). This is why students who learn with critical thinking abilities frequently achieve academic success. In the current decades, Higher-Order Thinking Skills (HOTS) has become the center of attention of some countries in the world to build their generation to be critical thinkers who are ready to face real-life situation in this era. Many countries applied HOTS as an aspect that should include in the curriculum at every stage of education including Indonesia.

The utilization of HOTS in the educational process, particularly in teaching and learning, is important. The effectiveness of learning itself may be impacted by learners' capacity for critical thought. The abilities include all varieties of abstract talents, such as problem-solving and critical thinking abilities (Nourdad, Masoudi, & Rahimali, 2018). Reid (2014) argues that students need to develop their critical thinking abilities urgently so that they can become aware of their own thoughts as they consider different approaches to an issue. Students who are self-conscious are aware of what they are learning, and those who are self-monitoring consider their strengths and weaknesses as problem-solvers. One of the thinking skills that people now require is the capacity to solve problems. The theory of human thinking skills was classified by Benjamin Bloom at the beginning of his publication entitled Educational Objectives: The Classroom of the Educational Goals. It was the original version explaining the learning objectives and thinking ability.

Since many years ago, the significance of those thinking abilities has been recognized. It follows that using HOTS in the classroom shouldn't have been a challenge for educators of all generations. Nowadays, there are essentially three generations of teachers. First, those who were born between Baby Boomers are those born between 1945 and 1964. The smallest generation, those born between 1965 and 1979, are referred to as Gen X or digital immigrants. Gen Y refers to those who were born between 1980 and 1999. According to Gibson, Greenwood, and Murphy (2009), this generation is also known as the Millennial, Echo-Boomers, and Net Generation. Teachers should be able to create and implement HOTS that is connected with the subject matter during the teaching and learning process (Sutarto, 2017).

Literature Review

Concepts of Higher-Order Thinking Skills (HOTS)

The 2013 Curriculum, developed by Indonesia's Ministry of Education and Culture (Kemendikbud), strongly emphasizes a strong emphasis on 21st-century abilities. Teachers are supposed to help students develop the 4Cs (critical thinking and problem-solving, communication, collaboration, and creativity), which are the pillars of 21st-century learning. (P21, 2011). Therefore, the teacher should employ instructional strategies that can help students develop their higher-order thinking skills (HOTS). According to Brookhart (2010), the idea of HOTS is the act of taking the knowledge that has been stored in memory,

restructuring it, and using it to serve a function in unexpected contexts. Additionally, HOTS is divided into three fundamental categories: transfer, critical thinking, and problem-solving. As a higher level of cognitive activity, HOTS includes the following skills: (a) the ability to apply knowledge and skills in new contexts; (b) the ability to describe the problem logically and solve it creatively; and (c) the ability to critically evaluate arguments and reach a conclusion.

Additionally, according to Brookhart (2010:5), the highest level of Bloom's cognitive taxonomy is higher-order thinking. Any cognitive taxonomy's educational objective is to enable transfer among students, according to the author. Higher Order Thinking (HOT) is the phrase used to describe "thinking at a level higher than memorization of facts or telling something back to someone." Additionally, "HOT requires students to act and takes thinking to higher levels than simply restating the facts." Additionally, the old paradigm frequently ran into the awareness of the necessity of creating a learning process that places a focus on HOTs in the twenty-first century. Under the Regulation of Education and Culture Minister of Indonesia Number 22 the Year 2016 concerning the Standard Process of Elementary and High Education, knowledge is acquired through actions such asanalyzing, evaluating, and creating. This statement is in line with the Bloom Taxonomy called HOTS.

The application of HOTS in the educational process, particularly in teaching and learning, is important. The efficiency of learning itself may be impacted by learners' capacity for critical thought. The abilities include all varieties of abstract talents, such as problem-solving and critical thinking abilities (Nourdad, Masoudi, & Rahimali, 2018). Weay, Masood, and Abdullah (2016) claim that Bloom categorizes educational goals into three categories: cognitive, affective, and psychomotor domain. The six stages of Bloom's taxonomy's cognitive domain are knowledge, comprehension, application, analysis, synthesis, and evaluation. The five levels of the affective domain are receiving, responding, valuing, organizing, and characterizing. Meanwhile, the psychomotor domain is classified into seven levels, namely perception, set, guided response, mechanism, complex over response, adaptation, and origination. Those three educational objectives are then popularly known as Bloom's Taxonomy.

In contrast, Harris et al. (2014) quote Anderson and Krathwohl (2001) who define a new cognitive domain that includes remembering, understanding, applying, analyzing, evaluating, and producing. The analyzing, evaluating, and creating tasks—which were previously handled by analyzing, synthesizing, and evaluating—are where the original and amended versions diverge. According to the revised version, producing is the highest level of mental capacity, while remembering is the lowest. On the other hand, As stated by Rajendran and Idris (2008) in Chidozie (2014), higher-order thinking skills involve the need of analysis, evaluation, and creation or production as thinking skills. As components of HOTS, analyzing is the capacity to dissect information into its component pieces and organize the pertinent information; evaluating is the capacity to consider something and develop an opinion; and generating is the highest capacity to produce novel ideas or concepts.

Higher-Order Thinking Skills in EFL Classroom

Higher Order Thinking Skills (HOTS) are divided into three categories by Brookhart (2010) based on the learning goals that students must attain. Transfer, critical thinking, and problem-solving are the first three. If a student is able to think critically, which means that they can make good decisions or offer valid criticism, they are considered to have HOTS. As a result,

they are able to offer justifications, reflect, and choose wisely. The student's capacity for evaluation is important to mention in this case. Students are required to be able to judge a source's reliability in the present era, where there is a variety of information, and determine if the material is reliable or not. In project-based learning, all of the HOTS components are present. Based on the aforementioned explanation, it can be concluded that project-based learning is unable to accommodate the achievement of three Basic Competencies, namely attitudes, knowledge, and, skills in the Indonesian 2013 Curriculum. Therefore, project-based learning can be used as an alternative in implementing the Curriculum 2013.

The National Research Council (1987) initiative, which covered a number of American schools, offered several major recommendations on different techniques to synthesize theories relating to HOT skills. The main study showed that HOT abilities had a significant influence on students' successful learning outcomes. It was discovered that kids compared to knowledge acquired by lower-order abilities, notably rote memorization, knowledge acquired through HOT learning processes is better retained in the long term.

Teaching English is commonly conducted by different teachers who bring various experiences and knowledge into the classroom. What the teacher brings into the teaching brings into the teaching-learning process will influence the students' outcomes. By exploring their perceptions, the result will become one of many references that may evaluate their behaviors toward the classroom, (Borg, 1999). Evaluating what the teachers do in the classroom, it may result in improving students' achievement, especially in the EFL Classroom. Istiqomah (2018) argued in her research, developing HOTS for junior high schools mainly in EFL Classrooms is not easy and challenging for them. Teachers and students face many difficulties in delivering English subject materials that employ HOTS in it. Students' different characteristics, levels of intelligence, and motivation become the factors that may influence their teaching-learning process (Juhansar et al., 2018).

HOTS Strategies in Pedagogical Practices

Frangenheim's model (2006) grounded on Bloom's taxonomy promotes strategies for pedagogical practices by integrating HOT skills which has the Thinking Skills Framework (TSF hereafter) for students (Table 1) and is complemented with the Teacher's TSF. This model helps teachers in understanding the importance of using HOT skills and empowers teachers with creative and innovative strategies in their pedagogical practices. Students become engaged in their learning through the TSF and they are able to practice HOT skills effectively through various activities. Results from various studies contend that students' interest and engagement in the classroom impact positive learning outcomes which even motivates them to pursue challenging tasks in the classroom environment (Ames, 1992; Kaplan et al., 2002).
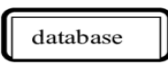
Bloom Level	Verbs	Starters	Tools
Design Acting like an inventor experiencing 'light bulb' moments to generate new products, ideas or ways of doing things	Create Extrapolate Improve Invent Predict Propose	Design a database for... Formulate criteria to judge... Develop argument... Design an action plan... Create a role play... Design brochures...	Software Y-Chart MAS Images
Evaluate Acting like the scales of justice to 'weigh up' the evidence to make and justify a decision	Argue Assess Conclude Critique Decide Judge	To what extent... Justify the decision of... Select options... Evaluate the effectiveness... Validate the accuracy... Determine which is effective...	Barometer Matrix Judge-Jury Draw Elimination
Analyse Acting like a magnifying to identify the component parts of an issue, situation or subject	Debate Deconstruct Differentiate Discuss Distinguish	Compare... Analyse from perspectives... Summarise viewpoints... Conduct research on... List the pros and cons	T-Chart Fishbone diagram Y-Chart T-Chart
$A = \frac{1}{2}bh$ **Apply** Acting to apply new skills, rules and concepts to related new situations	Calculate Compile Complete Demonstrate	Apply previous knowledge... Complete a site map for... Demonstrate how to... Construct a flow chart...	Role play Flow chart POE
Aha! **Understand** Acting like an expert, showing understanding of words, concepts, cause and effect and 'reason for'!	Classify Comprehend Discuss Explain Interpret	Explain how... Give reasons for... Research to understand... State 3 things you know... Describe clearly...	Cause-Effect Map Y-Chart Concept Map
database **Remember** Acting like an internet Database to recall Information	Define Find Label Memorise Recall	Name all the... Describe what happened... Search the internet for... What is ... List...	KWHL Y-chart Transfer-booklet 3:2:1 RIQ

Table 1: Thinking Skills Framework (TSF hereafter) for students

This study adopted Frangenheim's (2006) model. In this model, the students' TSF advocates engaging and individualized lessons where it paves the way for students to take ownership of their learning. In this TSF (Table 1), students will be able to understand the intended learning outcomes that the teacher designs through various questions and activities which educate students in the six cognitive levels of Bloom's taxonomy. When students learn about these levels, they are also exposed to the appropriate thinking tools for each of the six levels of thinking. Frangenheim's HOT model (2006) encourages 21st-century skills of critical and creative thinking skills to be acquired through questioning at the appropriate level and scaffolding of tasks by incorporating a range of collaborative and cooperative strategies. The learning outcomes are achieved through a combination of strong content knowledge and the effects on student engagement can be dramatic.

Methodology

Research Questions

The study was guided by the following research questions:

- What are ESL students' perceptions of learning writing using Higher Order Thinking Skills?

Research Design

The study aimed to explore students' perspectives on the use of Higher—Order Thinking Skills in their writing ability. To answer the research question, this research employed a qualitative case study method. This process (Cresswell, 2014) is what this study intends to. Therefore, this study employed a qualitative case study since it aimed to see the natural phenomenon of the teachers understanding and their teaching approach which were elaborated descriptively.

Research Sample

The sample is the three students who were selected. The participant had sought the cooperation of the researchers not to name the school, Students, as a measure of safeguarding the privacy of the EFL students involved in this study. Hence, the school will be named 'School A' and the location of this school was in a remote setting in Temanggung Regency, central Java Indonesia. The students were identified based on purposive sampling as the form one class was the target group that is currently experiencing the national based-assessment system. The case study was selected based on the criteria that the five students were selected as the sample for this study.

Research Instruments

A semi-structured interview and document analysis were conducted to collect information about the students' HOTS perception. To collect deeper detailed information, the document analysis is processed through a student's worksheet while the interview guideline was developed based on theories of HOTS by Anderson et al. (2001) and then analyze using TSF. Regarding HOTS theory the method was developed based on the Retnawati et al. (2017). The procedures permit the researcher to explore the data from the participants related to their understanding of HOTS in the writing context. For the Interview guideline were developed based on the knowledge. The interview was conducted at the beginning in which the results were used as the guideline for developing the observation checklist. The interview was conducted in a one-on-one mode which was recorded and transcribed for accurate recording. The interview sessions, which were held in a classroom immediately after school hours, aimed to elicit students' perceptions concerning the impact of using HOT skills in their EFL writing classroom.

Interview sessions were held after the completion of the teaching of writing using HOTS (four weeks). An interview schedule, based on Frangenheim's (2006) HOT model, was constructed to formulate appropriate questions that will facilitate the collection of the required data to answer the research questions. The construction of interview questions for the EFL students was given due consideration regards to the research questions, objectives and HOT skills' framework of this study. This procedure involved segregating themes and

issues in relation to the area of study which is closely aligned to the teaching and learning of writing using HOT skills. The responses provided by the EFL students were then analyzed deductively. The analysis looked into various aspects that encompassed the manner in which the students perceived the effectiveness of learning writing using the TSF.

Procedure

The participants are students in the ninth grade of junior high school who has learned to recount text. The teacher guided them to write the characteristics feature of the text and then the researcher analyzed using the Thinking Skills Framework (TSF). There were six choices in TSF cognitive domain. During the analysis of data, the researcher was briefed on the features of incorporating HOTS in the designing of the rubrics which is in relation to the TSF. They included the following tasks: asking students to write down their text, asking for semi-structured interviews, and providing specific feedback. These features of HOTS integrated the writing lessons were part of the journey in ensuring that students mastered the art of recount text and that processes experienced by students were engaging while creativity was promoted.

The TSF poster (Table 1) was guided and used by the researcher to analyze HOTS by taking into consideration Bloom's levels of remembering, Understanding, Applying, Analyzing, Evaluating, and Designing. The six elements in the TSF played an important role in ensuring HOTS. In the first lesson, the teacher highlighted the TSF to the students and Bloom's six levels of cognitive domains, the use of appropriate verbs, sentence starters, and the ways to employ the appropriate thinking tools. At the end of task 6, focus group interviews were conducted among 48 students who volunteered from the three intact EFL classes, with the aim of determining the extent to which HOT skills affect EFL students' learning of writing and their perceptions of learning writing using HOT skills. There were 2 focus group interviews that were conducted for each class: Group A and Group B from Class 1; Group C and D from Class 2 and Group E and F from Class 3. In analyzing student responses in the focus group sessions, pseudonyms were used to reflect actual student views.

Result

Students' Perception of Bloom's Taxonomy Level 1 (Remembering)

To analyze the students' perception of this stage, there were asked to write and talk about recount texts specifically their experience. They act as a source to recall information. The result indicated that all of the students use cognitive "Remember" in their writing product and in the interview but use different words. Student "A" stated TSF helped them to know the characteristic words that he would apply in their writing. The other students concurred with student A. Majority of students were excited to use "To be" and "Modality" to express the cognitive "Remember" while implementing HOTS both in their text or oral skills. They stated:

> "Last school holiday, I was happy because I could meet my grand parent again after a long time. The atmosphere there was very pleasant. I could play with my brothers and sisters".

The result indicated that TSF helped the students to be "aware of what was expected" from them in the lessons. They "felt that they performed better". All of the participants really

understand well in this cognition. The students were of the opinion the cause-effect map was helpful in understanding the ways in which elaborated their activity during their vacation.

Students' Perception of Bloom's Taxonomy Level 2 (Understanding)

Students conveyed their experience, acting like an expert in understanding the reasons why they can talk that their holiday is fantastic. Student B stated that the 'Wh' questions asked by the teacher had made them think "very deeply" to mention how fun they were on their holiday. He said:

> "What did you think about my trip? The vacation was fun. My cousins and I stayed for few days. It was great when every day joking around with my cousins, visiting the relatives' house, going to fields, and eating snack every without end".

Most students realized that the TSF helped them to be "More critical" of themselves in the lessons. They "felt that they do perfectly". They believe that this stage pushes them to explore and elaborate on the reason behind their fascinating holiday.

Students' Perception of Bloom's Taxonomy Level 3 (Applying)

Most students had collectively voiced out that they enjoyed themselves dramatizing their experiences during the holiday. Each of them has a different idea to share their argument. Student C stated,

> "At that time, when my cousins and I were walking through stairs and telling stories, then I suddenly fell and all eyes were looking at me. How embarrassed I am. Then I immediately stood up and continued on my way even though my legs were really sore".

Many other students felt the same way as student C and the idea in the form of storytelling was performed in class. When students were asked about their experience writing the recount essay, there were quite a number of responses that basically highlighted on students usually have a 'mental block' during writing but after experiencing the TSF lessons, students had "no problem and phobia" about writing essays.

Students' Perception of Bloom's Taxonomy Level 4 (Analyzing)

Almost all the students conveyed their "enthusiasm" acting like a magnifying glass to share their interesting and uninteresting stories. Student A said:

> "Last semester break was really fun. I can meet again with my family and enjoy a lots of food in Bantengan Art. This holiday will always be missed".

Many students communicated similar opinions as student A. The Fishbone diagram was a tool that "fascinated" students and they enjoyed the experience of applying their information to related writing activities in the classroom.

Students' Perception of Bloom's Taxonomy Level 5 (Evaluating)

From all the participants, it was clear that the majority of students stated that they gained "confidence" in having the opportunity to share and conclude the extent of their holiday experience. The students who considered themselves "shy", stated that they felt "grand" at being able to assume the role of judge-jury. Most students also communicated that they were able to critically evaluate situations, and discuss and recommend ways to control the knowledge. Student B stated, "I am not usually confident of my evaluation ability but not anymore though. I have realized my ability to evaluate well". Students C concurred with him and said "Oh yes! I feel the same too and am proud of myself for doing a good job. I was amazed at myself for being able to share my activity and conclude their impression of their holiday". Similar responses were stated by student A.

Students' Perceptions of Bloom's Taxonomy Level 6 (Designing)

All students communicated to the researchers that they felt like an "inventor" designing the brochure containing the activity about their holiday session. Student C said, "I felt cool and creative designing the brochure, especially the graphics. My friend edited it and other friends suggested colors and ideas for designing it. We worked so well together and never got this chance before". Several other students shared similar viewpoints and said that they imagined themselves being "future inventors".

Conclusion

The findings from the interviews indicate that students perceived their roles in the writing classroom as follows: they felt engaged in active learning, they experienced learner autonomy, they developed their writing, researching and personal skills as well. The HOT lessons promoted students' involvement and discussions in the classroom in which students believed that their ideas matter in the classroom. The HOT lessons tapped into students' prior knowledge by providing context-rich language resources and this concurs with Cummins, (1994) and Dong's, (2004) findings that language teachers play an important role to promote HOT skills aligned to language skills.

The students in this case study felt that HOT skills are nurtured by giving them a platform to compare, question, discuss, validate and reflect on their own and others' ideas. Research findings advocate that students from diverse ethnic and socio-economic environments in junior high should be given the platform to develop their HOT skills in real classroom teachings (Newman, Bryk & Nagaoka, 2001). In this study, students' ability to question their peers and likewise, answer their teacher's questions, provided a new dimension in their thinking and this in turn helped to develop their writing skills. The TSF fostered HOT skills among students when they learned to use the critical and creative thinking tools in a practical way and engaged in co-operative learning.

The findings of this study suggest that HOT writing lessons facilitate students' writing ability and interest and should be explicitly infused in the teaching and learning of writing activities in EFL writing classrooms. The TSF which was used as a conceptual framework of this study confirms the extensive effect of HOT skills in promoting students learning outcomes in writing where it has the potential to enhance students' minds, leading to the production of a variety of alternatives, ideas, actions, solutions and design. To some extent, the findings of this study confirm the significant value of HOT skills in generating ideas so students have the

potential in acquiring creative and critical thinking. While the findings of this case study cannot be generalized to all EFL classrooms in Malaysia, there is a possibility that the use of the TSF can be viewed as a viable option in the teaching of writing among other secondary school students, especially in regards to examining the potential of this framework in other EFL contexts.

Acknowledgments

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Attitudes of Students Towards Lessons Using Video Materials

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Abstract

This paper examines the attitudes of students toward lessons using video materials in the context of teaching the Japanese language to foreign students. Previous teaching methods in the field have shifted from grammar lectures to communication-based student-centered learning approaches. Consequently, the use of video content has gained popularity due to its effectiveness in enhancing learning outcomes and providing real-life examples difficult to express in a foreign language. In this research study, a survey was conducted on 56 Mongolian university students learning Japanese to assess the importance of video lessons in Japanese language classes and gather students' feedback on their experiences with video-based teaching. 96.4% of students believed that video lessons were necessary, indicating a strong interest and enthusiasm for incorporating video content into their learning experience. To find the motivational factors that motivate students, a factor search was conducted on 20 questions of motivation to learn Japanese and based on these questions: Factor I-identified regulation, Factor II-intrinsic motivation, and Factor III- external regulation. The survey results suggest that the use of video materials in Japanese language lessons can be highly effective. Students expressed a preference for video-based teaching, highlighting its potential to enhance motivation and create a real learning experience. Additionally, students who attended lessons using video materials reported higher satisfaction levels. Therefore, incorporating video materials into the classroom can be an effective approach to improving students' attitudes and learning outcomes in foreign language education.

Keywords: Video Lesson, Approach, Satisfaction, Motivation

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Introduction

In Japanese, hardware training is defined as "... demonstration and listening training ..." which refers to a course that uses film or programming. Researchers and many real-life examples show that the use of images and sounds for the human senses of sight and hearing enhances learning outcomes. This training plays a particularly significant role, especially in understanding difficult content to express in a foreign language. In recent years, content such as Japanese movies, plays, and anime has become popular all over the world through social media and the Internet, providing an incentive for Japanese language learners. In many countries around the world, there is a tendency to use video as a valuable learning tool for foreign language and cultural education. On the other hand, lessons that are only based on textbooks and chalkboards lack a comprehensive all-around learning environment for learning a new language. Audio-video training allows students to overcome some of the temporal and spatial constraints of any phenomenon, and to that extent helps to deepen students' understanding and knowledge. Some studies have shown that learners use these videos effectively for independent learning or extracurricular learning. Using such substance in classroom settings can strengthen the "relationship between classroom and extracurricular learning," and conducting video lessons that combine listening activities can improve the quality of teaching.

Based on the history of the development of teaching the Japanese language to foreign students, there have been three prevalent methods in the past.[1] In the beginning period, lectures on grammar structure and translation methodologies were predominant in the learning process. Such lectures were correlated to the social and political environment of that time. Consequently, from the 1980s, various practices for pronunciation and speaking skills, such as repetition and memorization became more popular. During both times, the learning processes were mainly instructor-centered. However, as a consequence of major developments and social research on the theory of learning a second language and the theory of language transformation, there have been many changes and shifts in improving communication-based student-centered learning methods and processes.

In Japanese, lessons aided by technological devices, which include movies and shows, are expressed as "demonstration and listening training." Practical real-life examples and science-based research studies show that the use of images and sounds for the human senses of sight and hearing enhances learning outcomes. More specifically, this method is important in conveying meanings and contexts that are difficult to express in a foreign language. In recent years, video content such as Japanese movies, plays, and anime has become popular all over the world through social media and the Internet, providing an incentive for Japanese language learners. There is a tendency to use video content as a valuable learning tool for foreign language and cultural education. On the other hand, lessons that are only based on textbooks and chalkboards lack a comprehensive all-around learning environment for learning a new language. Audio-video training allows students to overcome some of the temporal and spatial constraints of any phenomenon, and to that extent helps to deepen students' understanding and knowledge. Some studies have shown that learners use these video content effectively for independent learning or extracurricular learning. Using such substance in classroom settings can strengthen the "relationship between classroom and extracurricular learning," and conducting video lessons that combine listening activities can improve the quality of teaching.

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[1] Шибасаки Риэ "Япон хэлний ярианы сургалтанд видео хэрэглэх нь: " УБ., 2007

Research on Increased Video Materials During Japanese Lessons for Mongolian Students

There are many Japanese classes in many schools in Ulaanbaatar. It can be seen that in any bookstore, there are various Japanese textbooks, dictionaries, and video materials for Japanese learners in Mongolia. The schools that are teaching Japanese in their curriculums all have Japanese grammar, speaking, reading, creative writing, and translation lessons despite their differences in the number of learners in each school, demographics, lesson hours, and lesson content.

What Level of Importance Do Video Lessons Have in Such Classes?

To answer the above question, we conducted a survey on November 15th, 2017 on students learning Japanese. All around, 56 students with levels 1 and 2 from Mongolian universities participated in the survey. The results show 62.5% or 35 students have answered "yes" when asked if they have participated in classes with video lessons. However, 85.7% of 30 students answered "unsatisfied" when asked about the outcome of the lessons, which brings up speculation of whether the classes merely showed videos and did not follow up with thorough lesson materials.

When asked about whether having lessons that use video materials is necessary, 96.4% of 54 students answered yes, which shows the enthusiasm and interest of the students in video lessons in such a way that showing video content in class is highly effective.

Based on the survey results, it can be seen that using video content in lessons may even be more effective than many other ways of learning. The experimental lesson was designed and conducted in a way that lessons can increase learners' enthusiasm and motivate them as video content comprises visual aids, movements, and audio to create a real learning experience and environment.

Experimental Lessons and Analysis Using Video Materials in Japanese Language Teaching

Trial period of the experimental lessons: March 12, 2018 - April 12, 2018.

Twenty-four teachers of the Academy for the Promotion of Intellectual Development participated in this experimental course. The teachers do not have prior Japanese language knowledge as the center provides soroban counting tray training; therefore, they will be the learners in our study.

Course Description: Video technology has the advantage of being able to pause, restart, scroll, re-show, and show with or without sound. The order of the lessons has been decided in a way that it is possible to rewatch the videos as this type of lesson needs to be shown for the first time, for the second time, and the final stage.

Course Materials: A series of daily video lessons on learning Japanese through the everyday adventures and activities of Erin, a girl studying in Japan.

One of the main criteria for choosing a video is to know how the language elements are used and incorporated into the video conversation (grammar, usage, vocabulary, etc.). It is also important to observe the frequency with which the use occurs and select a video that matches

the topic of the lesson being taught. It is possible to find specific rules, grammar, and examples of usage in real life or films; however, it is time-consuming. Therefore, we chose a video material, which was made by a professional organization, to make the Japanese language training video easier to use and understandable to the students. Additionally, materials made by the researchers, such as vocabulary words, visual aids, and exercise sheets were used alongside the textbooks.

Student Satisfaction Survey

Satisfaction survey questions about experimental lessons were taken examples from the "classification assessment question" developed by Hoshino and Muta [2003]3 and the dissatisfaction scale of Ando (2000) "English language-related dissatisfaction". The lesson evaluation was divided into 4 sections: 7 questions for the lesson approach, 7 questions for the student's level of understanding, 2 questions from the communication matters, and 4 questions from the teacher's efforts. A total of 16 questions were selected and revised, which include:
- The question "I wanted to learn more" was changed to "3. I became interested in relearning Japanese through videos."
- The question "I understood the meaning of the Japanese-speaking content" was changed to "9. I was able to understand the meaning of the Japanese-speaking video in a conversation lesson."

For each evaluation question there are five levels to the answers: 1- don't think so at all, 2- don't think so much, 3- don't agree at all, 4- think so, and 5- absolutely think so. In addition, five questions were asked to freely write down their impressions of the lessons aided by video materials. The table below shows the survey questions for the satisfaction level of the Japanese language lessons.

Table 1: Student Satisfaction Survey Questions

№	Questions	Factors
1	I used to wait for the next conversation lesson	1
2	I was satisfied with the conversation lessons	1
3	I became interested in relearning Japanese through videos	1
4	I enjoyed watching videos and talking in conversation classes	1
5	The atmosphere in the conversation classes was good	1
6	The instructor taught me interesting things to learn in the conversation classes	1
7	The content of the conversation lessons was interesting	1
8	I was able to understand the meaning of Japanese words in the conversation classes	2
9	I was able to understand the meaning of the video in Japanese in the conversation classes	2
10	I understood the content of the conversation lessons well	2
11	I tried to speak Japanese	2
12	I tried to focus in the conversation classes	2
13	I tried to memorize Japanese vocabulary words	2
14	I was happy to be able to communicate in Japanese in the conversation classes	2
15	The voice of the teacher was clear in the conversation classes	3
16	The conversation material was appropriate	3
17	The teacher was effective in teaching the conversation class	3
18	There were relevant exercises in the conversation classes	3
19	The teacher was trying to make the students speak in the conversation classes	4
20	The conversation lesson was easy to read as the teacher wrote it on the board	4

Analysis of the Satisfaction Factor of the Experimental Lessons (Factor Analysis)

After the trial session, factor analysis was conducted on 20 questions about student satisfaction with the video lessons. Factor analysis (D. Chimgee, 2018, p. 164) reduces the number of variables in a model or examines the relationship between variables. It was explained that the main purpose of this analysis was to replace the multi-attribute or variable factor with a few attribute variables. The Promax rotation of the Maximum Likelihood method was chosen for factor analysis. As a result, three factors emerged. This model is shown in Table 2.

Table 2: Results of the satisfaction factor analysis of Japanese language lessons

Factor number	Questions
Factor I Student effort/level of understanding ($\alpha = .751$)	14 I was happy to be able to communicate in Japanese in the conversation classes. 8 I was able to understand the meaning of Japanese words in the conversation classes. 9 I was able to understand the meaning of the video in Japanese in the conversation classes. 12 I tried to focus on the conversation classes.
Factor II Course Satisfaction ($\alpha = .709$)	6 The instructor taught me interesting things to learn in the conversation classes. 7 The content of the conversation lessons was interesting. 3 I became interested in relearning Japanese through videos.
Factor III Teacher's effort ($\alpha = .733$)	15 The voice of the teacher was clear in the conversation classes 17 The teacher was effective in teaching the conversation class 18 There were relevant exercises in the conversation classes

Factor I can be regarded as a question related to the level of understanding of students as it comprises questions such as, "14. I was happy to be able to communicate in Japanese in the conversation classes," "8. I was able to understand the meaning of Japanese words in the conversation classes," "9. I was able to understand the meaning of the video in Japanese in the conversation classes," "12. I tried to focus in the conversation classes."

Factor II can be related to the approach to the lesson, as it includes questions such as, "6. The instructor taught me interesting things to learn in the conversation classes" and "7. The content of the conversation lessons was interesting."

Factor III is a question related to the teacher's diligence as it consists of questions such as, "15. The voice of the teacher was clear in the conversation classes," "17. The teacher was effective in teaching the conversation class," and "18. There were relevant exercises in the conversation classes."

The structure of the four factors was considered in the distribution of the satisfaction question; however, depending on the results of the research factor analysis, it was decided that establishing three variables is necessary. Cronbach alpha was used to test the reliability of the three-factor construction variable. Its results are shown in Table 3.

Table 3: Reliability of the variable's alpha

	Factors	Alpha (Cronbach)
1	Level of understanding of students	0.75
2	Attitude to the lesson	0.78
3	Teacher's effort	0.71

Course satisfaction factor I ($\alpha = 0.75$), factor II ($\alpha = 0.78$), and factor III ($\alpha = 0.71$) were the results, and the compatibility of the variable was considered sufficient.

The generated variable is the subscale score of the corresponding questions. The average score for each of the 24 students' variables was 4.19 (SD = 0.71), the attitudes variable was 4.21 (SD = 0.78), and the teacher's effort variable was 4.54 (SD = 0.66). Figure 1 below shows the distribution of satisfaction variables in Japanese language lessons.

Figure 1: Distribution of Japanese language lesson satisfaction variables (%)

In total, 71.61% of students answered 5-absolutely think so and 4-think so. Additionally, 72.53% of the students answered 5-absolutely think so and 4-think so to the distribution of responses to the lesson approach variables and the structure. It was observed that the students who attended the lesson using the video material were satisfied.

Conclusion

The analysis of the student satisfaction (distribution correlation) shows that students' attitudes toward lessons using video improved. Additionally, an analysis of student motivation factors was conducted, which resulted in three factors. To find the motivational factors that motivate students, a factor search was conducted on 20 questions of motivation to learn Japanese, and based on these questions: Factor I-identified regulation, Factor II-intrinsic motivation, and Factor III- external regulation. This is in line with the three factors identified in the Ando [2000] study: regulation, internal motivation, and external regulation. There was a coefficient ($r > 0.4$) for all variables between student motivation and class satisfaction. Therefore, it is concluded that the use of video materials had a positive effect on students.

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Youth and Adult Education in the Municipal Network of Barreiros in the Paths of Inclusion and Development: A Qualitative Approach in the Context of Popular Education in Latin America

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Abstract

This article aims to explain Youth and Adult Education in the Municipal Network of Barreiros in the paths of Inclusion and Development, in a qualitative approach in the context of Popular Education in Latin America based on the actions promoted by the Municipal Network, the social subjects, the curriculum and the role of municipal management in promoting public educational policies in contemporary times. The general objective is to understand Latin American Popular Education in a historical and cultural context based on public educational policies linked to Youth and Adult Education in the municipality of Barreiros – PE. Among the specific objectives we have: understanding the municipality's actions to reduce functional illiteracy: implementing literacy and basic education programs for young people and adults; promoting social inclusion and promoting education in flexible teaching modalities that allow students to combine their studies with work and other responsibilities and investigating how public educational policies aimed at continuous teacher training in the Barreiros Municipal Network develop appropriate teaching materials and adopt innovative pedagogical approaches. Literature analyzes indicated that, in the theoretical field, Youth and Adult Education in Latin America dialogues with the public educational policies promoted by the Rede Municipal dos Barreiros, Pernambuco, Brazil, as they strive for a reflective, critical, civic education, innovative, technological, professional and that promotes the student's comprehensive training.

Keywords: Youth and Adult Education, Latin American Popular Education, Quality Education, Education in the Barreiros Municipal Network

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Introduction

This study aims to explain Popular Education in a Latin American educational conception, focusing on Youth and Adult Education in the Barreiros Municipal Network, investigating paths to inclusion and development, based on government public policies, historical landmarks and academic publications. , we aim to make a connection between the history of Popular Education in Latin America, in the context of Youth and Adult Education, and the actions developed by the Barreiros Municipal Network in a qualitative sampling of education in this modality.

The general objective is to understand Latin American Popular Education in a historical and cultural context based on public educational policies linked to Youth and Adult Education in the municipality of Barreiros – PE. Among the specific objectives we have: understanding the municipality's actions to reduce functional illiteracy: implementing literacy and basic education programs for young people and adults; promoting social inclusion and promoting education in flexible teaching modalities that allow students to combine their studies with work and other responsibilities and investigating how public educational policies aimed at continuous teacher training in the Barreiros Municipal Network develop appropriate teaching materials and adopt innovative pedagogical approaches.

The methodological procedure used in this research was a bibliographic review and literary refinement, which was based on concepts from the works of Jara (2020), Pontual and Ireland (2006), Gadotti and Torres (2003), Freire (1987), Narita and Kata (2020), Carvalho, Ramalho and Santos (2019), Brutscher (2021), among others that address Popular Education in the historical-social context and its importance for social transformation to break heterogeneity. This work is a qualitative study, using bibliographic research, document analysis and constant data mining in articles and books.

We also use the case study, a scientific research resource that uses qualitative data, investigated and received from concrete events, in order to justify, explore or describe current situations within a specific context, without following a specific direction. investigation but mining data, which are collected from the reality investigated, in our case public educational policies for Education in the Municipal Network of Barreiros – Pernambuco – Brazil.

We also aim to understand Youth and Adult Education in Latin America based on a qualitative sampling of the Barreiros Municipal Network and its integration with the National Common Curricular Base and its relationship with the student's comprehensive training in the educational and social context based on the profile of the educator linked to 21st century Education, aware of the challenges that still exist such as infrastructure, training processes and teaching resources.

Justification

Popular Education in the Latin American context is an object of study and educational practice that plays a primary role in promoting social justice, equality and citizen participation throughout Latin America. This educational approach is based on concrete foundations and was developed in response to the needs of social subjects, within their specificities. Among the types of Popular Education we have Indigenous Education, Quilombola Education, Prison Education, Rural Education and Youth and Adult Education.

According to Pontual and Ireland :

> Popular Education, in a Freirean sense , wanted to be a specific contribution to revolutionary social change, one that could enhance a new type of education that formed individual and collective subjects and that focused on the protagonism of these subjects as a condition for the development of their historicity itself. (Pontual and Ireland, 2006, p.88)

When referencing the work of Paulo Freire (1987), we have the reflection of an education that needs to participate in the development of the student in its multiple dimensions, this education being in the context of Popular Education, a liberating education that breaks the historical hegemony that exists in Latino society. American. As one of the specificities of Popular Education, we have Youth and Adult Education which is made up of students outside the appropriate age range for regular schooling and needs special attention, as they are social individuals whose right to education has been denied to them either by social difficulties and/or people, or even the State's shortcomings in guaranteeing this modality for everyone in a given historical space.

In this context, we have public policies that are developed by the State with the aim of providing Popular Education, in the context of Youth and Adult Education (EJA) that enables the development of a liberating education, which encourages students to take center stage, their critical sense and their active participation in society.

Pontual and Ireland state that:

> What is today called "public policies" is not a matter that is purely the responsibility of the State, but also of society. If society and social movements are not involved in the constitution of the public, according to liberal logic, public policies will inevitably lead to technocratic, instrumental or clientelist practices. (Pontual and Ireland, 2006, p.89)

In this vein, we will approach Latin American Popular Education, having as a qualitative investigation point the Education of Youth and Adults in the Municipal Network of Barreiros, which has been developing successful public government policies regarding this educational modality. Actions such as the incorporation of educational technology can help make learning more dynamic and accessible, allowing EJA students to develop digital skills and have access to hybrid educational resources.

As for pedagogical actions, we have Popular Education in the Barreiros Municipal Network that adopts a student-centered pedagogical approach, in which students are active participants in the learning process. This contrasts with traditional authoritarian, decontextualized and passive methodological approaches, which do not motivate critical thinking, citizen participation and autonomy of students.

Another point of action is social empowerment where social subjects of education acquire knowledge, skills and confidence to face everyday challenges, in multiple dimensions such as social, economic and political. This process promotes the empowerment of social communities, enabling them to become agents of change in their own lives and in their societies.

Sustainability and development are also aspects that play an important role in the development of sustainability, environmental preservation and social development. Promote learning about environmental, economic and social issues, helping to build more conscious and responsible societies in relation to the environment, environmental preservation and the well-being of all.

In this sense, Latin American Popular Education promotes a holistic, dynamic and participatory educational approach that respects cultural diversity and empowers communities, through their students, to become agents of change in their own lives and in their societies. Therefore, the promotion of Youth and Adult Education in this governmental path is a fundamental instrument for building a more inclusive, qualitative and equitable future throughout Latin America.

In the normative context, according to Brazil (1988) and LDB (1996), we have EJA as an educational modality aimed at those who did not have access to or completed Basic Education (Primary Education, Early and Final Years and High School) at the regular standard age. Also according to the references, EJA must be offered free of charge and with the same quality and equity as regular education, adapting to the needs and characteristics of students outside the age group, young people, adults and the elderly.

Education of Young People and Adults

Youth and Adult Education (EJA) in the Latin American context is a fundamental action to correct the educational distortion in the countries that make up the bloc, thus acting as a fundamental pillar for promoting inclusion, accessibility and reducing educational inequalities. Thus, EJA is a type of education aimed at citizens who did not finish their studies at the correct age and its offer guarantees the right to an education that aims to fill this gap. Thus, EJA provides learning opportunities for young people, adults and elderly people in Basic Education, in the modalities of Elementary School, initial and final years and High School.

However, according to Machado (2008), it is common knowledge that we have challenges in EJA classes such as the quality of the teaching and learning processes, training of teachers prepared for these educational modality, accessibility and dropout rates. Along this path, we believe that improving Youth and Adult Education (EJA) will require investment in human resources, school infrastructure and the incorporation of new practices and pedagogical supports. In this north, all of Latin America will be able to reap the benefits of a population that is more educated and prepared for the job market, the promotion of citizenship and a society strengthened by justice and social equity. EJA is a strong mechanism for promoting the right to education for students' comprehensive training.

Along this path, EJA's challenges include school dropout, which is the abandonment or even lack of participation of students in classes due to multiple aspects, such as work, family issues and personal situations. Another challenge is the quality of teaching, which can vary, and the lack of inputs, such as infrastructure, transport, textbooks and personal motivation, in addition to the need for qualified teachers for this stage of work and accessibility.

History of Education in Barreiros – Pernambuco – Brazil

The history of education in Barreiros, Pernambuco, is marked by challenges and advances that reflect the educational context of the state and Brazil as a whole. To understand this trajectory, it is important to observe the main milestones and developments over the years. During the colonial period, education in Barreiros, as in much of Brazil, was restricted to religious institutions, mainly the Catholic Church.

The Jesuits played a significant role in education, but access was limited to the white elite and the children of wealthy settlers. With Brazil's independence in 1822, there was a gradual increase in interest in education. The Empire promoted the creation of public schools, but education continued to be the privilege of the wealthier classes.

With the Proclamation of the Republic in 1889, significant changes occurred in the educational system of Barreiros and Brazil. Laws were enacted that established the secularization of education, making it more accessible to a greater number of people. However, illiteracy was still high, and public education faced structural challenges.

In the 1950s and 1960s, there were advances in Brazilian education, including the actions that took place in the municipality of Barreiros – PE, with the creation of the National Education Plan (PNE) in 1962, establishing guidelines for the expansion of education and the reduction of illiteracy. There was an effort to build public schools and promote basic education throughout the country.

During the Military Dictatorship (1964-1985), education suffered political interventions and ideological censorship. However, during this period, the government also invested in expanding the educational system, including Youth and Adult Education (EJA), although there was strong repression of freedom of expression and civilian indoctrination to military precepts.

With the return to democracy in the 1980s, there was a renewed focus on the democratization of education in Barreiros and throughout Brazil. Laws and policies were enacted that guaranteed access to education for all, regardless of age, race or social class.

Today, Barreiros, like the rest of Brazil, continues to face challenges in the educational area. Improving school infrastructure, teacher training, promoting inclusion and combating illiteracy are some of the current concerns. In addition to regular schools, Barreiros also has technical and vocational education institutions, with the Escola Técnica Estadual Central Barreiros and the Instituto Federal de Educação Polo Barreiros – PE, which aim to prepare young people for the job market. These institutions offer courses focused on different areas, such as agriculture, industry, hospitality and commerce.

Youth and Adult Education (EJA) plays an important role in the city, providing learning opportunities for those who did not complete their studies at the appropriate age.

Furthermore, educational technology and the search for partnerships with governmental and non-governmental institutions are ongoing strategies to improve the quality of education in Barreiros and meet the demands of today's society.

In short, the history of education in Barreiros, Pernambuco, is a narrative of evolution and overcoming challenges over the years, reflecting efforts to provide quality and inclusive education for all its citizens.

Methodology

The methodological procedure used in this research was a bibliographic review and literary refinement, which was based on concepts from the works of Jara (2020), Pontual and Ireland (2006), Gadotti and Torres (2003), Freire (1987), Narita and Kata (2020), Carvalho, Ramalho and Santos (2019), Brutscher (2021), among others that address Popular Education in the historical-social context and its importance for social transformation to break heterogeneity.

This work is a qualitative study, using bibliographic research, document analysis and constant data mining in articles and books. We also aim to understand Youth and Adult Education in Latin America based on a qualitative sampling of the Barreiros Municipal Network and its integration with the National Common Curricular Base and its relationship with the student's comprehensive training in the educational and social context based on the profile of the educator linked to 21st century Education, aware of the challenges that still exist such as infrastructure, training processes and teaching resources.

As an object of investigative study, in a qualitative approach, we have the Barreiros Municipal Network in serving Youth and Adult Education students, through documentary research, interviews with participants and analysis of educational indicators such as SAEPE (State of Education Assessment System). Pernambuco), IDEB (Basic Education Development Index) and PISA (International Student Assessment Program).

The documentary analysis, in notes, reports and results of the municipality's internal and external evaluations led us to understand that the work carried out by the Barreiros Municipal Network regarding public educational policies directs us towards an evolutionary path of education, with priorities for accessibility, professional education, use of innovative pedagogical support, constant ongoing training linked to educational practices, provision of quality school meals and teaching material associated with the students' reality of life.

Main Research Aspects

Scientific research is implemented in different aspects of investigation:
- **Literary refinement**: deepening the theme in different authors with the aim of understanding different arguments about the investigation
- **Needs Identification**: Monitor surveys and research to identify the demand for EJA programs in the Barreiros community
- **Structuring Courses and Programs**: Monitor the implementation of personalized curricula and study programs to meet the specific needs of EJA students
- **Teacher Training**: Supervise regular training and qualification for EJA teachers, addressing best pedagogical practices and teaching strategies
- **Infrastructure and Resources**: Identify actions to improve the infrastructure of schools that offer EJA, ensuring adequate facilities and access to modern educational resources
- **Monitoring and Evaluation**: Strengthen the continuous monitoring and evaluation system to measure student progress and identify areas for improvement

- **Partnerships and Resources**: enhance actions that promote partnerships with civil society organizations, higher education institutions, local companies and government agencies

Expected Results

The main results expected from the actions analyzed include:
- Significant reduction in functional illiteracy in Barreiros
- Increase in the EJA completion rate
- Improvement in students' reading, writing and mathematics skills
- Greater inclusion of marginalized groups in education
- Development of a more educated and egalitarian community
- Inclusion of students in the job market

Conclusion

This study approached Popular Education in a Latin American educational conception, focusing on Youth and Adult Education in the Municipal Network of Barreiros, investigating paths to inclusion and development, based on government public policies, historical landmarks and academic publications, we aim to make a connection between the history of Popular Education in Latin America, in the context of Youth and Adult Education, and the actions developed by the Barreiros Municipal Network in a qualitative sample.

In this direction, we realize that public educational policies on Youth and Adult Education in the Barreiros Municipal Network are initiatives that aim to transform the lives of young people and adults through education. By offering new dynamic, flexible and inclusive learning opportunities, the educational actions of the Barreiros Municipal Network contribute to the educational, economic and social development of the Municipality, enabling its citizens to build a better future for themselves and the community.

EJA plays a crucial role in the development of inclusive education and the reduction of social inequalities. Youth and Adult Education provides training for young people, adults and the elderly who seek to acquire basic educational skills in order to improve their quality of life, professional development and participate more effectively in society. In this way, EJA makes it possible to reduce illiteracy and create more informed and engaged citizens.

In the Latin American context, EJA challenges educators, managers and politicians to develop effective public policies to meet the specific needs of this population. This research addressed the challenges and opportunities associated with EJA in a Municipal Education Network, highlighting the importance of an education that promotes: access and retention, literacy and literacy, motivation and self-esteem, financial and material resources, preparation for the job market and improvement specific pedagogical approach for educators using innovative methodologies.

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Preparing E-Tutors for Success:
A Qualitative Analysis of a Community Management Training Module for Students

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Abstract

The role of corporate community managers, who facilitate digital and cross-location collaboration within corporate communities, is comparable to that of e-tutors, who moderate and assist virtual group work in the university context. E-tutors have a variety of tasks that go beyond merely monitoring their supervised groups. They need to be equipped with numerous competencies to ensure successful e-tutoring. However, current literature only partly addresses how e-tutors build the required understanding and competencies. This study investigates the gap of how a qualification module for e-tutors should be designed to prepare them best. For this purpose, seven participants in an e-tutor qualification module were interviewed. It became apparent that the qualification module had gaps, especially in the training of intercultural competencies, which in turn influenced the interviewees' readiness to become e-tutors. Additionally, beneficial formats for competence development were identified. The study found that Virtual Collaborative Learning (VCL) is a helpful format for developing several competencies, particularly media competencies. In addition, certain framework conditions must be given to attract students to the module, e.g., practical relevance. Based on the findings, the study provides recommendations for designing a qualification module for e-tutors, including the importance of addressing intercultural competencies, incorporating e-tutor tandems, and providing VCL opportunities. Additionally, the study analyzes the consequences arising from its findings, explicitly focusing on their direct impact on succeeding cohorts of e-tutors. This study provides significant insights into developing competencies for e-tutors while offering practical recommendations to enrich their e-tutoring experience.

Keywords: Flipped Classroom, E-Tutors, Competencies, Competence Development, Higher Education, Virtual Learning, Qualification, Collaborative Online Learning

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Introduction

As digital education continues to expand and adapt to our interconnected world, the role of e-tutors is more important than ever (Martin-Cuadrado et al., 2021; Raviolo et al., 2023; Schneider & Preckel, 2017). Like corporate community managers navigate the world of virtual collaboration in companies, e-tutors moderate and support virtual group work, but within the context of higher education (HE). Their broad range of responsibilities (Langesee, 2022) is central to the quality of digital learning experiences, highlighting the need for adequately trained e-tutors (Kopp et al., 2012).

However, little study has been done on the qualification process for e-tutors with this understanding. Even though Heuel & Feldmann (2013) discussed a standardized European e-tutor qualification, they focus on the e-learning competence of traditional teachers and professional tutors. To the best of our knowledge, there are no standards for how e-tutors acquire the competencies and expertise they need to support virtual group work. In addition to analyzing the basic qualification of e-tutors, the focus will also include the subsequent development and reinforcement of competencies. This extended approach can address competence deficits in a more long-term manner.

This presents us with the critical question of how the qualification of e-tutors should be designed to prepare them for practical application (RQ1). This question spotlights a gap in current research and suggests a need for a practical exploration of an effective structure and content for an e-tutor qualification module.

In addition to RQ1, this study proposes two additional research questions. First, "How does the e-tutor qualification module affect the development of e-tutoring competencies?" (RQ2). This question aims to assess the strengths and weaknesses of the existing module from students' perspectives.

The third research question probes into the possibility of tandem e-tutoring: "What are the participants' anticipations and perceptions regarding the potential implementation of e-tutor tandems, and what aspects do they foresee as potentially positive or negative?" (RQ3). This question aims to understand the participants' expectations and perceptions about introducing e-tutor tandems in the supervision phase, as the tandem approach was already successfully tested for e-tutors (Langesee & Ukhova, 2023).

This study aims to analyze the readiness of e-tutors for their roles regarding key competencies. Furthermore, it investigates the potential of different formats in further developing competencies for e-tutors. This study's contribution lies in critically examining the e-tutor qualification module by interviewing the participating students post-module. After a qualitative content analysis, the paper provides practical recommendations and identify areas for improvement to enhance the overall quality and effectiveness of e-tutoring, potentially impacting the next generation of e-tutors.

Theoretical and Conceptual Background

This chapter delves into the theoretical and conceptual background supporting the paper, setting a baseline for a more nuanced understanding of the subject matter.

E-Tutors

Central to this paper are e-tutors and the qualification process to become one. However, clearly defining "e-tutor" can be challenging due to its various interpretations and synonymous terms. E-tutors may also be identified as e-moderators, e-coaches, distance learning instructors, or online tutors. According to de Metz & Bezuidenhout (2018), e-tutors are primarily involved in offering support to distance learners. However, Jödicke & Teich (2015) offer a more fitting definition for this research as they identify e-tutors as facilitators whose role is to aid students in achieving their learning objectives in current virtual learning frameworks. Unlike traditional tutors, e-tutors supervise, support, and direct the learning journey rather than deliver knowledge directly.

In addition, e-tutors act as students' first contact and help with diverse aspects of the learning experience. The support activities range from technological to organizational, from content-related to interpersonal challenges (Jödicke & Teich, 2015). To summarize, e-tutors can be viewed as facilitators of learning who fortify virtual learning processes within today's HE landscapes.

Qualification Module

To be able to support students in such a setting, the e-tutors need to qualify first. There is a broad range of scenarios where e-tutors can be deployed. However, only a few publications shed light on the concrete qualification of e-tutors in HE (e.g., Adamus et al., 2009; Doukakis et al., 2013; Heuel & Feldmann, 2013). In the context we investigated, e-tutors are supportive moderators in VCL modules (Clauss et al., 2019).

The VCL concept is a student-centered approach in higher education where students work in groups to solve realistic case studies using collaborative technology, e.g., MS Teams. It involves synchronous and asynchronous activities and requires a case study, learning platform, pedagogical support by e-tutors, and learning analytics (Clauss et al., 2019; Schoop et al., 2010).

In this paper's context, the e-tutors' training occurs in a semester-long master's module utilizing a flipped classroom approach. Employing the flipped classroom approach, the module incorporates e-lectures for content delivery, in-person seminars for reinforcing the content, and a four-week VCL phase on MS Teams.

The VCL allows students to experience a collaborative virtual learning environment first-hand. During this period, students are grouped into teams of four to six, working on weekly tasks drawn from a realistic case study. Students must assume various roles, such as project manager, reporter, and expert for Business Administration, technology or human resources. Qualified e-tutors accompany the VCL phase.

The module comprises six main themes, specifically tailored to cater to the roles and responsibilities of e-tutors while also addressing the basics of community management. It incorporates lessons and tasks on organizational support, technical support, group-related support, subject-related support, feedback, and assessment. They learn to manage learning activities, handle and solve conflicts proactively, develop intercultural skills, and provide effective feedback. Adding to this, students gain a glimpse into the day-to-day operations of

an e-tutor, facilitated by real-life experiences shared by active e-tutors. Upon successful module completion, students are qualified to become e-tutors.

The module's thematic focus areas are illustrated in Figure 1.

Figure 1: Content of the E-Tutor Qualification Module

Competencies

To match the multifaceted role of an e-tutor, specific competencies are necessary. During a qualification tailored to the tasks of e-tutors, exactly these should be addressed.

Fulfilling the diverse roles of an e-tutor requires distinct competencies that differ significantly from those needed for traditional face-to-face tutoring (Langesee et al., 2022). Despite numerous discussions, a universal definition of competence remains elusive. Generally, competence combines knowledge, skills, and attitudes (Baartman & de Bruijn, 2011; Le Deist & Winterton, 2005). These competencies, while identifiable and measurable through behavior (Rowe, 1995), are not static attributes but can be developed.

Another established definition by North (2021) explains competencies as personal abilities that can be cultivated to act suitably in given situations. It is a well-rehearsed process to stimulate, direct, and utilize personal resources, ensuring effective handling of intricate scenarios, tasks, and actions. These elements are intrinsically tied to performance and can be enhanced through educational interventions (Parry, 1998). This perception of competencies provides a basis for the discourse in this paper.

A comprehensive exploration of the specific competencies required by e-tutors to effectively supervise student groups was carried out in Langesee (2022; 2023). This study identified the following key areas of competence: pedagogical, professional, social, intercultural, media, communication, organizational, individual, and evaluative. Notably, these nine competence areas overlap considerably with 21st-century skills.

A competence-oriented qualification is an important approach in HE that aims to develop students' knowledge, skills and attitudes that are relevant to their personal and professional development in the 21st-century. This qualification focuses on the learning outcomes and the ability to apply them in different contexts rather than on the input or content of the curriculum. It can enhance graduates' employability, mobility and lifelong learning, as well as their social responsibility and civic engagement (Brauer, 2021).

Therefore, adequately addressing the underlying competencies is essential to succeed in the modern work environment (Bourn, 2018). A recent work by Pérez-Sanagustin et al. (2022) also states that HE institutions must address the reality of post-Covid-19 more than ever, including competence-oriented teaching (Dlouhá et al., 2019).

Methodology

This chapter offers an in-depth look into the research methods utilized in the study, namely semi-structured interviews and qualitative content analysis, clarifying the systematic approach taken for data collection and interpretation.

Semi-Structured Interviews

The qualitative data collection in this study was anchored in semi-structured interviews, a method widely recognized in social science research (Magaldi & Berler, 2020). The interview guide was meticulously crafted to frame the questions and systematically structure the research process, allowing a beneficial balance between comparability and the capacity to glean additional, valuable insights (Kallio et al., 2016).

This guide comprised four thematic blocks. The initial block communicated the interview's objectives within the introduction (Helfferich, 2010), while the second aimed to foster a pleasant atmosphere for the interviewee, promoting openness for the duration of the interview (Edwards & Holland, 2013). The main part of the interview was occupied by the third and fourth thematic blocks, focusing on assessing nine specified competencies (Langesee, 2022) and the effectiveness of seminars, e-lectures, and the VCL as teaching formats.

The final block also provided opportunities for suggestions for module improvement, with open-ended questions allowing interviewees to offer detailed insights and suggestions (Kallio et al., 2016). The interview guide was pre-tested and refined based on feedback (Weichbold, 2022).

Seven students, who were active participants in the course, were involved in the interviews (Table 1). This selection criterion ensured the interviewees had firsthand experiences and knowledge of the module. To maintain a diversified view, interviews were conducted by two researchers (Graneheim & Lundman, 2004).

The interviews were recorded using MS Teams, which also facilitated automatic transcription. The final transcription adhered to Dresing and Pehl's (2018) guidelines, ensuring anonymity in line with Elo and Kyngäs' method (2008) for the coding process.[1]

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[1] The interview guideline and transcripts can be found in the online appendix: https://tud.link/hp24

Variable	Characteristics	Frequency (N=7)	% of N
Age	23	2	28,6
	24	1	14,3
	25	3	42,9
	26	1	14,3
Course of Study	Business Administration	4	57,1
	Business Information Systems	1	14,3
	Business Engineering	1	14,3
	Business Education	1	14,3
Semester (Master or Diploma)	3	2	28,6
	5	2	28,6
	9	2	28,6
	11	1	14,3

Table 1: Overview - Demographics of Interviewees

Qualitative Content Analysis

According to Elo & Kyngäs (2008), a qualitative content analysis was conducted to extract the relevant information from the interviews to answer the research questions. It consists of three phases: preparation, organization, and reporting. The preparation phase focuses on defining the study object - in this case, the interviews. The qualitative data is analyzed using the selected method during the organization phase. This study used a combined deductive-inductive approach (Ravindran, 2019) to code interviews, leading to twelve main categories from the interview guide. Post-deduction, interview-based coding began, and independent subcategories were inductively formed.

After initial coding, the subcategories underwent discussion for quality validation, resulting in 41 subcategories (Graneheim & Lundman, 2004). Subsequently, the distribution of the subcategories was discussed. Afterward, the researchers reviewed each other's work to ensure quality. The detailed category assignment can be found in the online appendix.[2]

Seven main categories are of main interest for answering the research questions and are therefore presented in detail. The remaining five main categories are integrated into the analysis as they foster the understanding of certain results and help to put them into context. An overview of the main categories can be found in Figure 2. The green-colored main categories are discussed in more detail in the upcoming section.

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[2] https://tud.link/hp24

Biographical Data	Previous Pedagogical Training	Qualification Framework	Prior E-Tutor Activity
Pre-Module Competencies	Post-Module Competencies	Influence of Formats	Wishes
Learning Analytics, Gamification, Chatbots	Expectations and Challenges	E-Tutoring and Community Management	E-Tutor Tandem

Figure 2: Overview of Main Categories

Results

This chapter presents the results of thematically relevant thematic blocks three and four from the interview guide and its deductive-inductive categories, according to the final phase of qualitative content analysis by Elo & Kyngäs (2008).

Pre-module Competencies

To evaluate and document the competence level before the module, participants were initially queried about their pre-module competencies in the opening segment of the interview.

Four participants (I2, 3, 5, 7) specified they had notable social competence prior to participating in the module, enhanced through previous group work instances. Pedagogical competence was found exclusively in students with business education or those who attended modules specifically focusing on pedagogy (I1, 4, 7). One participant (I2) explained that their first exposure to feedback was only through schooling.

Three participants (I1, 3, 5) affirmed pre-existing professional competence, particularly in the realm of virtual collaboration, prior to the module. The majority (I1, 3, 5, 6, 7), because of their experience as working students, exhibited varying levels of organizational competence involving methodologies such as SCRUM (I1).

Similar to their organizational competence, most of them (I1, 3, 4, 5, 7) also showed a well-developed media competence, especially in using Microsoft 365, including MS Teams, which are commonly used in business settings. Three participants (I2, 5, 7) reported having distinct communication competence before the module.

Intercultural competence was reported by only one participant (I1), although it was somewhat subdued, primarily due to language constraints. Individual competence was generally well-developed among some participants (I1, 2, 7). One interviewee (I1) named their creative work environment a contributing factor. However, only one participant (I3) claimed to have evaluation competence, which they attributed to their prior education.

Post-module Competencies

Participants particularly highlighted the development of pedagogical competence (I1, 2, 4, 5, 7). Although it was not the module's direct focus, it was refined during the intense virtual collaboration phase, with the reflection on individual and group methods emerging as a significant contributing factor (I5).

The participants described a positive development of their media competence (I1-7), primarily attributed to compulsory involvement with the collaboration platform and various MS Teams tools, such as the "Praise" function and the Planner (I5). However, data analysis abilities remained underdeveloped or non-existent (I2).

The interviewees experienced a development of their communication competence (I1, 2, 3, 4, 6, 7), although unevenly across participants. The rationale for this development lies in intense group work and the unique demands posed by virtual communication (I1, 6). A participant's role within the team also played a key role, with project managers developing this competence more than regular project members (I3).

The interviewees mentioned that they positively developed evaluation competence by giving each other feedback and (jointly) reflecting on the feedback received (I1, 2, 3, 4, 6, 7). The interviewees reported being frequently encouraged to engage in self- and group reflection.

Participants described that multiple factors facilitated the development of social competence (I1, 2, 3, 5, 6, 7), including accommodating diverse personalities and work styles within group work (I1). Essential collaborative tasks also fostered intensive teamwork, positively impacting social competence. The creation of the group contract emerged as another contributing factor (I6).

Additional information on the collaboration platform helped some participants to develop professional competence (I1, 3, 5, 6, 7). The module, described as a "protected area" by one participant (I6), offered a safe space for experimenting with MS Teams, a common collaboration platform in many companies. Autonomously handling tasks and researching group work topics also enriched professional competence (I1).

However, growth in organizational competence was described less (I1, 2, 7), with the role of the project manager lauded for making group-based organizational decisions (I6, 7). The structuring of learning activities also contributed to its development (I2).

The interviewees reported that they did not develop individual competence independently but that it was encompassed within other competencies, such as virtual communication improvement (I1, 3, 4, 6, 7). Nevertheless, creativity, an attribute of individual competence, was not addressed.

Regarding intercultural competence, participants reported no significant development (I1, 2, 3, 4, 6, 7). Only one noted having a non-native speaker in the team (I5), which presented opportunities to enhance intercultural competence to a certain extent, for instance, by rephrasing tasks for unified comprehension.

Influence of Formats on Competence Development

The study found that participants identified VCL as the most conducive teaching-learning format for competence development. However, it was noted that it was not a single format but a mix that often contributed to competence development. For instance, a blend of e-lecture, seminar, and VCL was instrumental in fostering pedagogical competence (I1, 2, 4, 5, 7), with the e-lecture for initial knowledge transfer, the seminar for consolidation, and VCL for application.

Media competence was initially addressed through e-lecture and subsequently enhanced through practical usage in the VCL (I1-6). For communication competence, participants highlighted intensive seminar discussions and VCL experiences as catalysts for development (I1, 2, 3, 5, 7).

The merging of the three teaching-learning formats helped to enhance professional, individual, and evaluation competencies (I1-7). Like communication competence, social competence primarily advanced through the seminar and VCL activities (I1-6).

Organizational competence was primarily developed via VCL (I1, 2, 4, 5, 6), with two respondents noting that the degree of improvement varied based on roles (I1, 5).

Regarding intercultural competence, VCL played a significant role for participants who directly interacted with non-native speakers (I2, 4, 5). One respondent added that e-lectures also provided valuable support in advancing their intercultural competence (I1).

Perceptions on E-Tutor Tandems: Benefits and Challenges

Interview outcomes on the e-tutors tandem concept presented diverse perspectives regarding group formation and task delegation (I1), underlining the significance of diversity and heterogeneity in tandem pairs (I1). To bypass redundancy, a respondent emphasized the necessity for clear roles within groups and at least one point of contact per topic (I3). Furthermore, pairing an experienced e-tutor with a novice was suggested (I5), allowing two new e-tutors to collaborate and navigate their roles together (I5).

In summarizing the interviews concerning the benefits of the e-tutor tandem model, it emerged that collaborative work and the advantage of having a second opinion were positively regarded (I1). Some interviewees also recognized the potential value of an e-tutor network, while others suggested they might prefer working independently (I2). Participants noted the supportive role and sense of security provided by e-tutors as beneficial (I3, 5). This dual supervision also opens opportunities for new methodologies, insights, and techniques (I7).

A sizable pool of qualified individuals is required to successfully deploy the tandem model to meet the learners' needs (I1). The availability of financial resources could also impact the feasibility of task distribution (I2). Some participants expressed that task sharing may only sometimes be essential and could potentially lead to resource wastage (I3, 4).

Preparing for Dual Roles in E-Tutoring and Community Management

The interviews underscored the significance of an emotional component and human touch within the e-tutor role (I1). One Interviewee differentiated the e-tutor's role as a learning process supervisor from the actual learning process itself (I2). Contrarily, some participants mentioned needing more preparation for assuming the e-tutor role (I4-7). Nonetheless, e-tutor experience could prove beneficial in undertaking the community manager position (I3).

Different views were expressed regarding the preparation for the job as a community manager. Two interviewees stated that previous work as an e-tutor could facilitate their work as a community manager (I1, I3, I6). However, some expressed a desire for more concrete insights into group assessment and a need for behind-the-scenes insight (I1, 5, 7).

Bridging the Gap Between Expectations and Challenges in the Module

Participants stressed some challenges associated with the course. One respondent struggled with language nuances, which hindered their active participation and expressed a desire for enhanced engagement opportunities in certain situations (I1). Difficulties emerged in the effort to immerse oneself in the tasks which mention diverse locations without being physically present. Another respondent highlighted issues of role distribution and encountered limitations in understanding the project manager's role (I5). The issue of unclear role assignments and specific task allocations was also a contention.

Practical relevance within the course emerged as a significant theme in the interviews. One participant expressed a desire for increased real-world applicability (I1). Another participant revealed that the course lessons significantly influenced their personal life (I4). A further wish for the inclusion of practical, situational exercises was expressed by another interviewee (I7).

Participants voiced diverse suggestions concerning the course. One respondent hoped for a more explicit definition of e-tutors and that e-tutors assume roles similar to traditional tutors (I1). A request for more tangible e-tutoring preparation emerged from another respondent (I5), while the proposal to include the course in undergraduate studies was put forth by another to engage potential e-tutors earlier in their academic journeys (I6).

Concerning roles in e-tutoring, respondents relayed a handful of criticisms. A participant pointed out varying competence requirements and attributes depending on the assumed role (I2). Another participant gave constructive feedback on project management, proposing improvements to competence identification and application (I3). Critiques of role labeling, allocation, and group hierarchy were voiced by a fourth participant (I4) and echoed by another, who further observed differences in competence promotion based on roles (I7).

The Role of Learning Analytics, Chatbots, and Gamification

Three interviewees wished to use learning analytics (I1, 2, 4). One wish is the provision of user data in a meaningful form (I1). One interviewee mentioned the implementation of gamification in this context (I7). Another described utilizing reactive and proactive chatbots for providing and showing information (I4).

Discussion and Recommendations of Action

This chapter addresses the implications of the findings and offers suggestions for improving the design of e-tutor qualification modules and competence development.

This paper presents an intriguing exploration of an e-tutor training module. One of the key takeaways from the paper is how the flipped classroom concept has proven beneficial in enhancing several competencies. The paper argues for a blended approach, where a mix of formats would enhance competence development.

However, the paper also acknowledges that not all competencies can be addressed and thus developed equally. For instance, the training module falls short of enhancing intercultural competence. One approach for improvement is integrating international students into the module, which could broaden the intercultural perspective and enhance the relevant competencies. Generally, a heterogenous group composition during the VCL phase is highly recommended.

The qualitative analysis shows that the initial qualification module lays a strong foundation for e-tutors. The paper further argues for enhancement via e-tutor tandems, which can facilitate a more profound competence development for e-tutors. The results make a compelling argument for adopting e-tutor tandems in the training module, suggesting they can provide a beneficial balance of peer interaction and work-sharing. Working in tandem facilitates a shared responsibility approach, thus alleviating the workload pressure on novice e-tutors. This distribution of tasks paves the way for more strategic planning and problem-solving, potentially improving the tutoring quality and enriching the supervised students' learning experience. The tandem arrangement fosters a supportive and secure environment, promoting competence development and building confidence.

Furthermore, innovative approaches such as learning analytics, chatbots, and gamification were called for. In addition to providing user data through learning analytics, gamification approaches can be used for appropriate representations to overview the behaviors of the student group. Additionally, they should be presented in a motivating way for the student groups to foster their engagement with them. In addition, using proactive and reactive chatbots is considered helpful for early identification of missing digital literacy and answering questions. Implementing such approaches supports e-tutors in the operational tasks and enables them to focus on the pedagogical work assignment and their competence development.

In addition, it must be noted that the examined e-tutor qualification is embedded in a formal learning setting. As discussed in Langesee & Ukhova (2023), competence development can be enhanced by informal settings, such as self-directed e-tutor tandems. Subsequent employment as an e-tutor and participation in (informal) competence-enhancing activities can promote more intensive engagement with an e-tutor's competencies.

Finally, the paper identifies tandems as particularly valuable for first-time e-tutors. They provide an additional contact person, which gives a sense of security and motivates students to become active e-tutors. It emphasizes the importance of applying theoretical knowledge from the training module in practice, enhancing the learning experience, and further addressing the key competencies.

Conclusion

This research explores an e-tutor qualification module and the potential of e-tutor tandems to enhance their competence development. Our findings yield robust answers to the proposed research questions.

Responding to RQ1 and RQ2, we observed that participation in an e-tutor module enhances vital competencies for e-tutoring, primarily through a blend of teaching-learning formats. These include a VCL phase, e-lectures, and seminars, each contributing uniquely to competence development. VCL emerged as the most beneficial format, which suggests the need to incorporate more such interactive and collaborative learning experiences into e-tutor qualification modules.

Especially regarding RQ1, our study indicates that the e-tutor qualification module positively impacts several key competencies. Participants describe a significant development in pedagogical, media, communication, evaluation, and social competencies in the post-module interviews. However, a development in organizational and individual competence was less pronounced, suggesting that these areas might benefit from additional focus in the module design. Intercultural competence did not significantly advance, indicating the necessity for future research to incorporate intercultural sensitivity in e-tutor qualification programs.

Concerning RQ3, our study reveals positive opinions about the e-tutor tandem approach. Most participants viewed it as a potentially beneficial method, allowing for collaboration, shared feedback, and security, which can lead to more confidence in e-tutoring and enhanced competence development. However, resource constraints and the risk of redundancy were cited as potential challenges. Thus, deploying e-tutor tandems requires careful planning, clear role definitions, and sufficient resources to ensure successful implementation. Additionally, personal competence development is crucial but challenging. Further addressing the individual competencies of e-tutors can be a first step in this direction while also fulfilling the objective of competence-oriented learning in HE.

As in every research, some limitations must be acknowledged in this study. One constraint is the five-month duration of the module, which may not sufficiently allow for e-tutors' competence development. A follow-up approach for competence development, like e-tutor tandems, can be used to counter this. Also, the small number of interviewees is limiting but gives exciting insights and adds to the knowledge base of e-tutoring in HE.

Inherent subjectivity in qualitative research, stemming from personal perspectives and experiences during data interpretation and analysis, can potentially introduce bias (Noble & Smith, 2015). To counteract subjective and biased evaluation and analysis, coding, analysis, and interpretation were conducted in close consultation between two researchers. Another way to mitigate this could be to apply mixed-method research using multiple perspectives and data sources (Taherdoost, 2022). The constraints mentioned might affect the generalization of results across diverse individuals and populations.

Future research should focus on several key areas. First, a follow-up quantitative evaluation should be pursued to validate the presented findings and identify broader and underlining trends. Second, examining the efficacy of the proposed recommendations in practice would solidify our understanding of competence development. Furthermore, the use of gamification and chatbots could support the positive development process of competencies.

Additionally, piloting the e-tutor tandem concept during the VCL could provide prospective e-tutors with a practical understanding of this approach. Ultimately, iterative research is essential for optimizing the e-tutor qualification process for the HE landscapes.

Overall, this research paper presents a robust analysis and contributes valuable insights to the literature on e-tutor qualification and competence development.

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Supporting Schools, Educators, Students, and Families in a Transition to a Four Day Week

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Abstract

The study discusses the transition of schools in the Emirate of Sharjah from a five-day workweek to a four-day workweek at the start of January 2022, and explores results of surveys conducted to assess satisfaction of stakeholders and challenges that educational institutions and communities faced with this transition. The survey sought to understand the impact of this change on critical variables such as productivity, family financial impact, student learning, work-life balance, wellbeing, health, and school operations. The results released in May 2023 showed high level of parent satisfaction and financial savings, high motivation and satisfaction among school employees, and improved physical and emotional wellbeing of student skills and their ability to be more self-directed; to engage in socialization leisurely activities after school. The results also revealed certain challenges that teachers and professional staff reported in finding sufficient time to cover the required school curriculum, prepare lesson plans and attend professional development during the reduced school week. With global interest across all sectors in reducing the work week from five days to four, it is imperative that educational researchers and regulators understand how the Western literature can have either positive or negative impact on policy borrowing across Western, Middle Eastern, South Asian, and Eastern cultures. This paper provides early guidance to policymakers, practitioners, and scholars on these matters.

Keywords: Sharjah, Schools, Reduced Workweek, School Hours, Work Life Balance, Welllbeing, Productivity

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Introduction

Reduced workweek in Sharjah evolved for different reasons than those in other parts of the world. It emerged in Sharjah to accommodate the long-standing tradition of maintaining Fridays as non-working days and to conform to the United Arab Emirates declaration in January 2022 that made Saturdays and Sundays as the official weekend days. Unlike Sharjah, the reduced workweek in other parts of the world evolved for purely economic reasons or to respond to demands for less working hours in the interest of providing greater family time. For example, moderate body of literature in the United States on reduced working hours in schools were due to two factors: first, limited transportation options in rural areas requiring school systems to find alternate solutions, such as reducing the week from five days to four; second, readiness for change because of COVID online learning schemes, particularly prompted by other social or economic necessities, such as limited transportation.

The literature on reduced working hours in schools is sparce outside Western contexts. Sharjah, with a diverse student population, is an ideal location to expand the global knowledge base on time reduction in school. While countries, as well as multilaterals, such as the OECD, have set minimum expected days of school per year as policy or benchmark, online/distance learning has increasingly allowed for new methods of accounting for learning time. Yet days in school, or even hours in school, have been subject to country comparison assuming no difference in quality of learning. Time in school has various productivity implications by culture, including expectations of guided practice, independent learning, teacher-centered instruction, as well as other educational constructs.

The Emirate of Sharjah transitioned to a four-day workweek in January 2022. All private and government schools have therefore implemented a four-day week, Mondays through Thursdays. To support schools, educators, students, and families in this transition, the Sharjah Private Education Authority (SPEA) conducted various stakeholder surveys during January and February 2023. The results of these surveys have provided SPEA with a clear set of indicators on satisfaction and challenges, related to such aspects as productivity, learning, work-life balance, wellbeing, health, family financial impact and school operations. The results, summarized in this report, provide insight into the ways in which schools, families, and educators have responded, both positively and negatively, to the changes. The results are being utilized by SPEA, as a regulatory body, to suggest new initiatives that aim to support the wellbeing and productivity of schools, students, educators, and families. The results are also a catalyst for SPEA's sister organization, the Sharjah Education Academy (SEA), to improve the professional development courses provided to teachers and school leaders.

The Educational Landscape in Sharjah

Sharjah is the third largest Emirate in the UAE by size, with its population comprising 22.4% of the total UAE population. The population is made up of 88% expatriates, with the majority originating from South Asian and Arab countries. Sharjah has succeeded in attracting a large talent pool due to a leadership focus on education, government's various policies to attract and retain talent within the Emirate, and the Emirate's relatively low cost of living compared to neighboring Emirates. Figure 1 shows the distribution of Sharjah's population across the major municipalities.
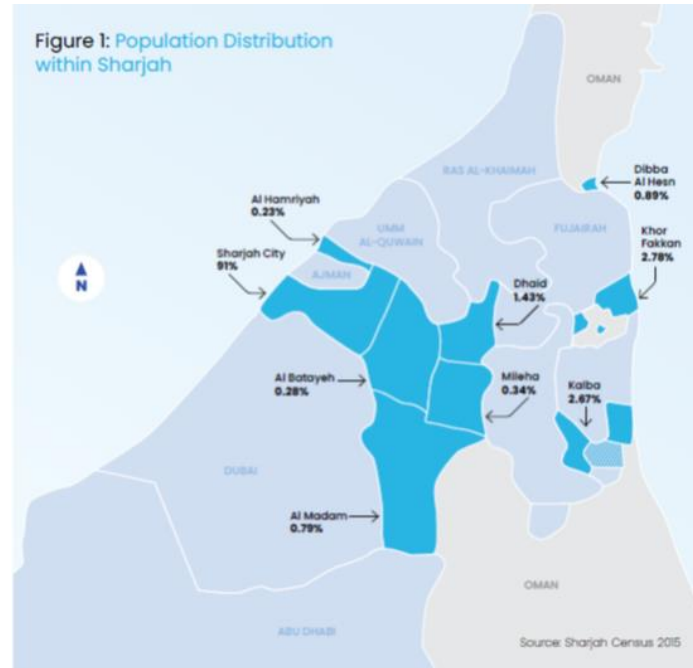
Figure 1: Distribution of Sharjah's population

Over the last decade, Sharjah has witnessed a steady growth in the number of private schools, from 94 schools in 2013/2014 to 130 schools in 2022/2023. Currently enrolled in the 130 schools are approximately 185,000 students.

The number of private schools in the UAE has increased at a higher rate than public schools. The percentage of public schools in Sharjah has decreased from 92% in 2009/2010 to 49% in 2018/2019. As illustrated in figure 2, Private schools in Sharjah follow ten different curricula, with the highest school numbers utilizing British/IB, American, Indian, and UAE Ministry of Education curricula. Between 2017 and 2022, the number of American and British/IB curriculum schools increased at a compound annual growth rate of 4.5%.
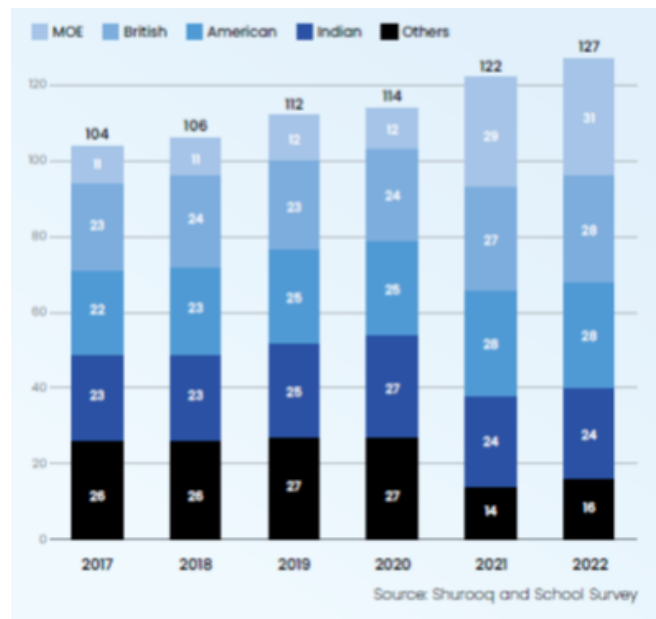
Figure 2: The distribution of curricula in Sharah (2017-2022)

More than one third of total enrollment is in schools utilizing the Indian curriculum. Schools offering the British curriculum are the second most popular, with 21% of total enrollments. Enrollment in private schools is centralized to a large degree in the city of Sharjah (97%), with more than a quarter of enrollments in the district of Muwailah. Enrollment distribution by curriculum is illustrated in Figure 3.
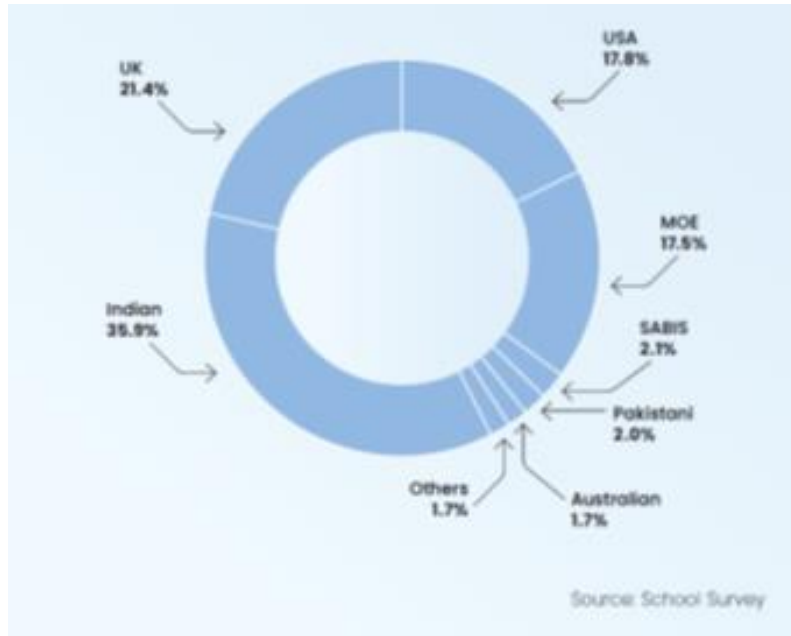
Figure 3: Student enrollment by curriculum (2021-2022)

The overall student-to-teacher ratio across Sharjah's private schools is less than 18 to 1. In 2021/2022, 11,902 teachers were employed by 122 private schools in Sharjah, with an expatriate teaching workforce of 98%. Student-to-teacher ratios are as low as 6 to 1 in premium-priced schools, whose tuition fees are above AED 50,000 per year. As shown in figures 4 and 5, the highest student-to-teacher ratio is in Indian curriculum schools, followed closely by schools that offer the UAE Ministry of Education curriculum.
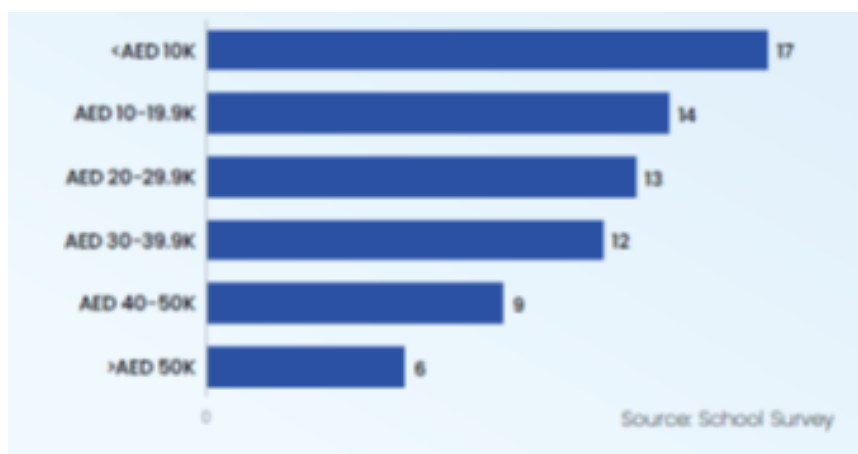
Figure 4: Student to teacher ratio by tuition fees (2021-2022)

Figure 5: Student to teacher ratio by curriculum (2021-2022)

The student-teacher ratio (STR) is the number of students divided by the number of teachers in a school. It is a measure of the workload for teachers and the level of individual attention that students receive. A lower STR is generally considered to be better, as it allows for more individualized instruction and support. However, there is no single ideal STR, as the optimal ratio will vary depending on the specific needs of the students and teachers.

In the United States, the average STR for public schools is 16:1. However, there is a wide range of STRs across the country, with some schools having ratios as high as 30:1 and others as low as 8:1. The STR is also affected by the grade level, with elementary schools typically having lower ratios than middle and high schools.

Sharjah private schools have approximately 32,000 vacant seats, which translates into a capacity utilization rate of 84%. The capacity utilization rate, which represents the percentage of filled seats in schools, is calculated by dividing enrollments over maximum capacity. The current capacity utilization level, which is within the optimal utilization levels of 80-90% for primary and secondary education, enables schools to meet additional demand in the short term and maintain the flexibility needed for rearranging student schedules. While Indian curriculum schools have a high utilization rate, they have 30% of the free seats. A quarter of the free seats are in the American curriculum schools, followed by British and UAE Ministry of Education curriculum schools (17% and 15%, respectively). Accordingly, Sharjah Private Education Authority developed a forecast model illustrated in figure 6, to forecast the estimated number of needed school till 2026.
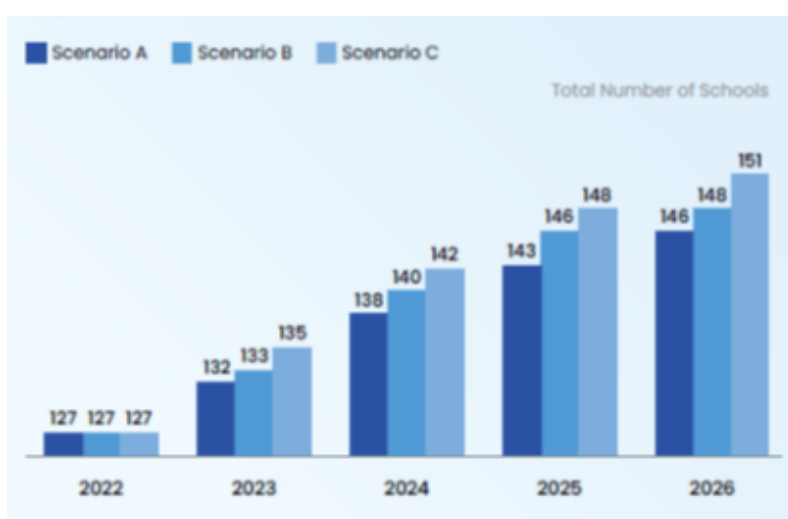
Figure 6: School Demand Forecast (2021-2022)

The key growth drivers for primary and secondary private educational institutional growth include expatriate population growth, government support for quality education, and parental high spending on education in the UAE. The UAE's school-going population is estimated to grow from 1.3 million in 2021 to 1.5 million in 2028, according to the United Nations population forecast (Insights, 2023). Sharjah's existing large expatriate population, estimated at 88%, underlies the preference for international curricula. SPEA's 2022-2024 strategy with its focus on four strategic priorities of: enhancing the quality of life and wellbeing of the educational community; promoting trust in the quality of education; fostering a culture of innovation, creativity, and continuous learning, as well as encouraging Sharjah's competitiveness in the education sector, are strengthening Sharjah schools' ability to attract more students.

The Four-Day Work Week in Sharjah

The four-day workweek was implemented in the Emirate of Sharjah in January 2022. This step occurred following the decline of COVID-19 and the new ways/practices of applying efficiency at the workplace. Globally, COVID-19 strained supply chains, accelerated governmental deficit spending, and produced high rates of inflation. COVID-19 nevertheless enhanced governmental and private sector focus on strategic priorities associated with risk mediation, competitive advantage, innovation, and quality of life.

During the 2020-2022 period throughout the globe, organizations in both the public and private sectors implemented and continually adapted work-from-home plans. Habits regarding work, learning, and recreation shifted, creating new knowledge for post-COVID productivity, work-life balance, and remote learning. This was true around the world, and particularly so in Sharjah—and, like schools and educational systems throughout the world, these adaptations and learnings occurred in Sharjah's schools. In particular, as the Sharjah Education Academy (SEA) had been developed in the midst of the pandemic, it became clear that teacher knowledge and skill needed rapid updating to address the hybrid learning approaches that were adopted across schools.

The shift to the four-day workweek in Sharjah occurred as a result of the lessons learned in the years of COVID-19, as well as a desire to innovate in work-life balance and human capital development, while also finding new ways to utilize technology to increase productivity. Upon implementation of the four-day workweek across the education sector in Sharjah, other reform initiatives began to take shape, led through the expert support of the Sharjah Private Education Authority (SPEA), including quality improvement for early childhood education, PK-12 school improvement, and identification and support for students of Special Needs. The four-day workweek implementation occurred alongside various other strategic priorities and reforms that aim to increase human capital development, organizational productivity, wellbeing and work-life balance.

Global Trend

Time magazine recently reported that 2023 will be the year of the four-day work week (Abend, 2023). This expectation was driven by various pilot programs that found positive aspects in reduced workweeks across the globe. For example, results of a recent study published in the UK showed there was no productivity loss among 61 private firms that participated in the reduced workweek (Lewis, Stronge, Kellam, & Kikuchi, 2023). While most focus on the changes in the length of the workweek has been on private sector work in

knowledge-focused jobs, education employs a large share of educated workforces in most developed countries, and therefore, must be considered in changing attitudes about the workweek. Furthermore, education cannot be disentangled from the overall workforce due to family constraints with regard to childcare and transportation.

The four-day week is a trend that will continue globally as more institutions and countries achieve tangible returns that support continued implementation. With the trend expanding, the impact will also be significant on school systems that will switch to either reduced working hours or a four-day school week. Some school districts in the United States, as well as some school systems in South Pacific countries, are among the few places this has been attempted before. For example, in the 1970s, with high fuel costs, some school districts in the United States reduced the week to four days temporarily (Armitage, 2022). Some rural school districts also moved to a four-day week during the 2008 economic recession, in order to save on resources (Sawchuk, 2021). Additionally, there are 662 school districts across the United States that made the same transition since COVID-19 (Thompson & Morton, 2021).

The transformation in the United Sates has been encouraged by positive results. Using data from the Colorado Department of Education in the United States, Anderson and Walker (2015) argued that the four-day week has positively affected the percentage of students scoring at the proficient or advanced levels on mathematics and reading achievement tests. Further studies in the United States suggest that the four-day week gave students opportunities to spend more time on homework and extracurricular activities. It also had an impact through decreased per-pupil bullying incidents by approximately 31% and per-pupil fighting incidents by approximately 27% (Morton, 2021). In one study in the United States, 85% percent of parents and 95% of students said they would choose to stay on a four-day school week, after experiencing it (Kilburn et al., 2021).

Methodology and Participants

SPEA conducted the study with a clear focus of measuring the impact of applying the 4-day workweek on productivity, learning, work-life balance, wellbeing, health, family financial impact and school operations. SEA has collaborated with SPEA in producing this report. The formal study was conducted between January and February 2023. Parents and school employees (teachers and administrative staff) were surveyed. Both surveys comprised closed-ended items (the parent survey had 33 questions; the employee survey had 24), as well as some open-ended items. Both surveys had three questions about positive experiences, challenges, and recommendations. The parent survey was administered electronically in Arabic and English to all parents of children in the private schools in Sharjah targeting approximately 185,000 students. The employee survey was electronically administered to 17,663 employees among 130 private preK-12 schools. Both surveys were administered during a short timeline from the 27th of January to the 3rd of February 2023, to determine the perceptions and ratings about the four-day workweek.

Over the course of seven days that the survey was open, a total of 31,198 surveys were completed by parents. Of parent survey-takers, 66.4% were female and 33.6% were male. In terms of age, 49.2% of parents reported that they were from "30 to 39" in age and 39.2% reported that they were "40 to 49" years old. 83% of parents reported that they lived in Sharjah, with 11% living in Ajman. 97% of the parents were married.

School employees were also surveyed. Of 17,663 total employees in Sharjah private schools, 6,988 completed the survey (approximately 40%). Of these, 5,421 were teachers out of a total of 12,464 teachers (43%). Of non-teachers, survey takers included specialists, librarians, nurses, counselors, secretaries, school leaders, and other positions. Employee survey takers from Indian curriculum schools constituted the highest proportion (45%), with British and American following (24% and 18% respectively). Of employee survey-takers 83% were female and 17% were male. In terms of age, 42.4% were from the "30 to 39" age category, and 31% were "40 to 49" years old. 71% of employees lived in Sharjah and 18% lived in Ajman. 85.4% of employees were married. In terms of annual school tuition, 36% of employees completing the survey worked at schools with less than 10,000 AED annual tuition, 32% were in schools with annual tuition from "10,000 AED up to 20,000 AED;" and 32% worked in schools with annual tuition from "20,000 AED to 56,000 AED". For school size (e.g., number of students enrolled), 28.2% of employees worked in schools with less than 2,000 students, 33.1% were in schools with from "2,000 up to 3,000" students, and 38.7% were in schools with at or above 3,000 students. For a total number of classes taught per week, 34.4% taught "16 to 23" classes, 54.4% taught "24 to 28" classes, and 11.2% taught "29 to 38" classes per week.

Parent Survey Results

Parents reported a high level of satisfaction with the four-day workweek, with Emirati parents reporting a higher level of satisfaction than all parents together on most measures. Work-life balance, level of happiness, and social-emotional health are all reported to be increased as a result, with again Emirati parents expressing a higher level of satisfaction than all parents together.
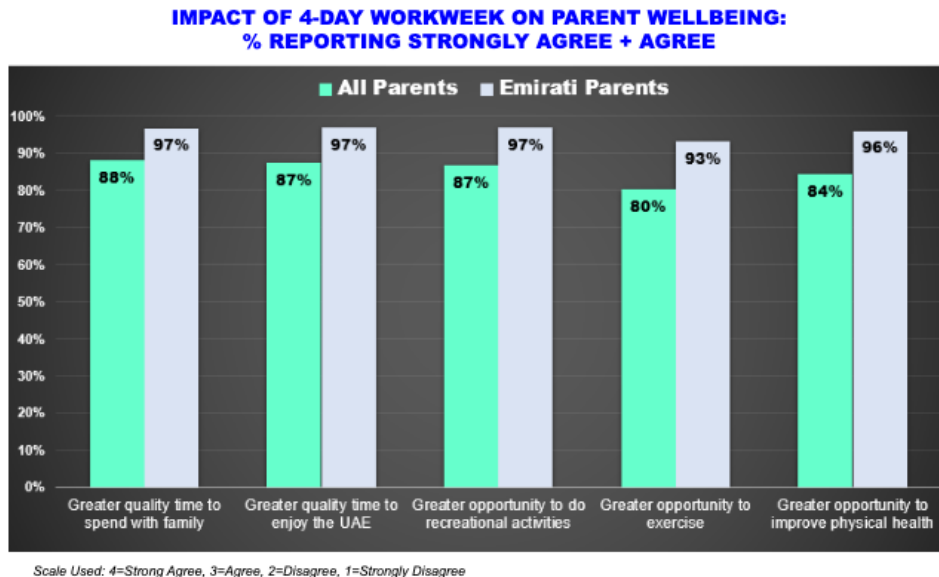
Figure 7: Impact of 4-day workweek on wellbeing
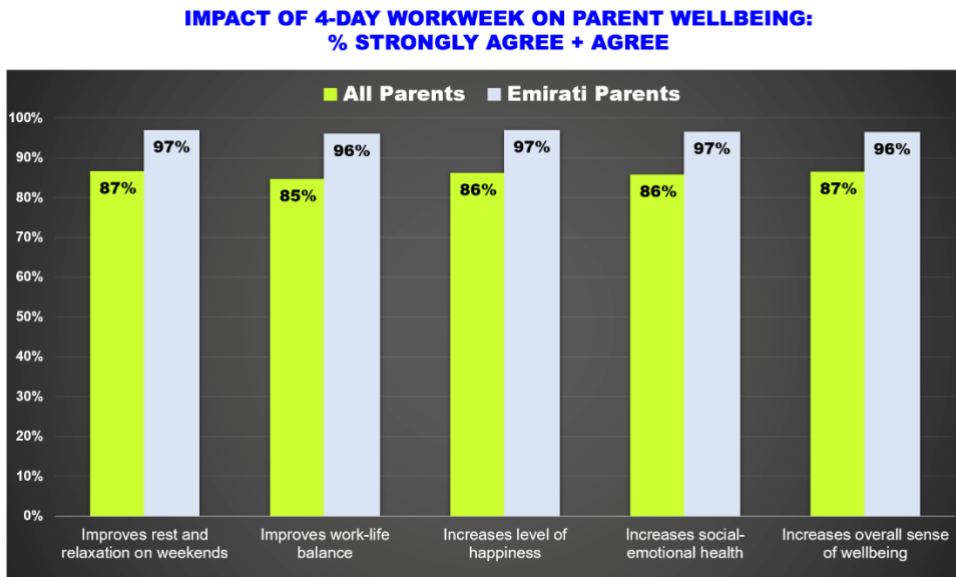
Figure 8: Impact of 4-day workweek on wellbeing

In terms of financial saving, parents clearly reported a benefit in financial savings due to the four-day day work week. 79% of Emirati parents noted that they have benefited by saving on transportation while also 48% of all parents noted a benefit. In addition 80% of Emirati parents reported that they saved on fuel costs due to commuting one day less per week. The results also show that parents reported additional saving in utilities and health care (78%).
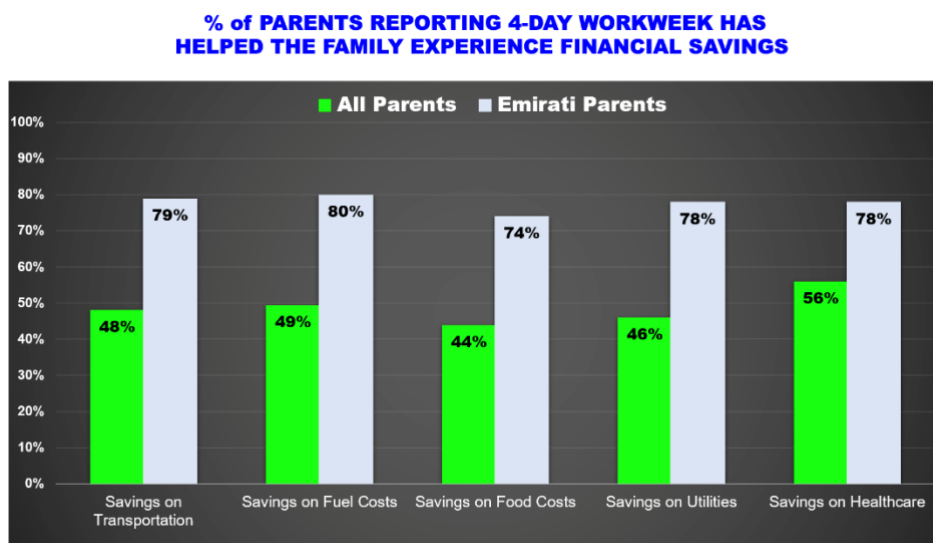
Figure 9: Impact of 4-day workweek on financial saving

Parents recognize that the four-day week has improved: school attendance (81% of all parents), participation in extracurricular activities (75% of all parents), and improvement in completing school assignments (80% of all parents). Parents largely have indicated that their children feel more productive (78%) and happy (81%).
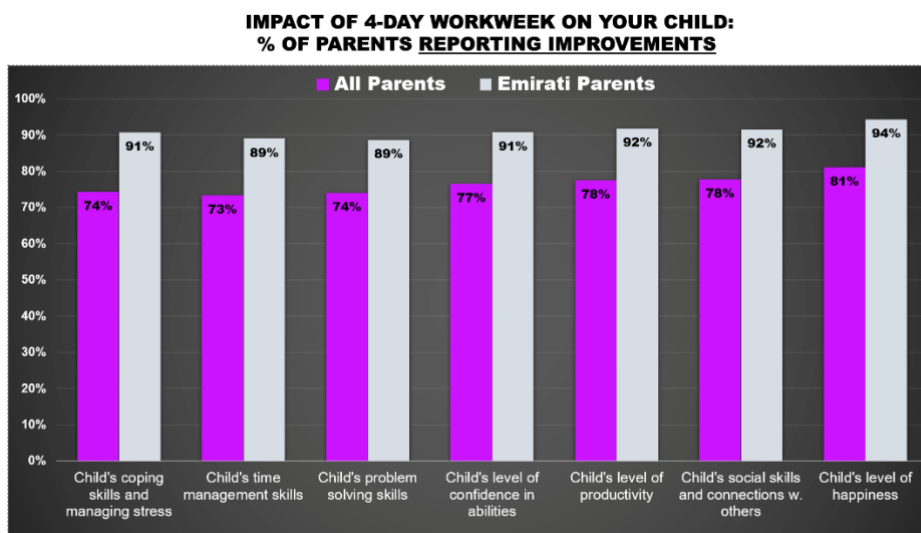
Figure 10: Impact of 4-day workweek on children improvement
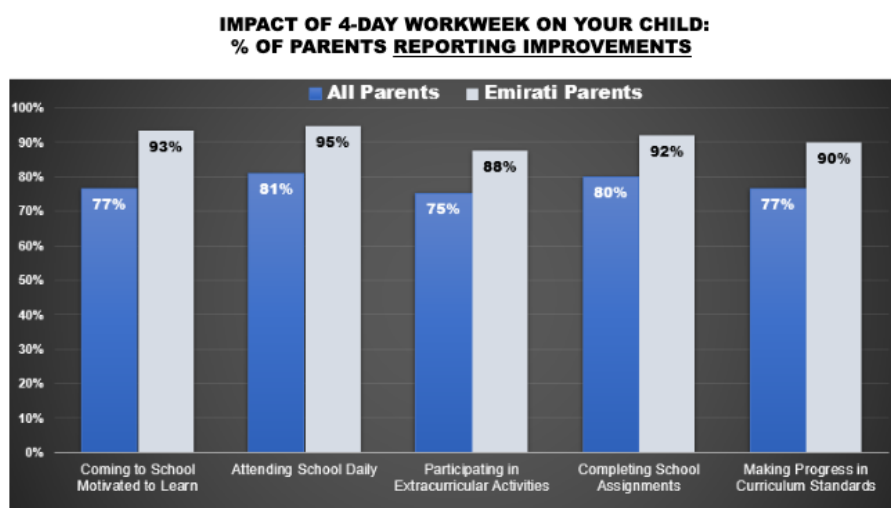
Figure 11: Impact of 4-day workweek on children improvement

Parents reported that the transition to a four-day week has positively impacted the participation in students' participation in extracurricular activities, their motivation to learn and had a generally positive impact on their children's socialization (79% of all parents, 92% of Emirati parents) and relaxation (81% of all parents, 93% of Emirati parents).
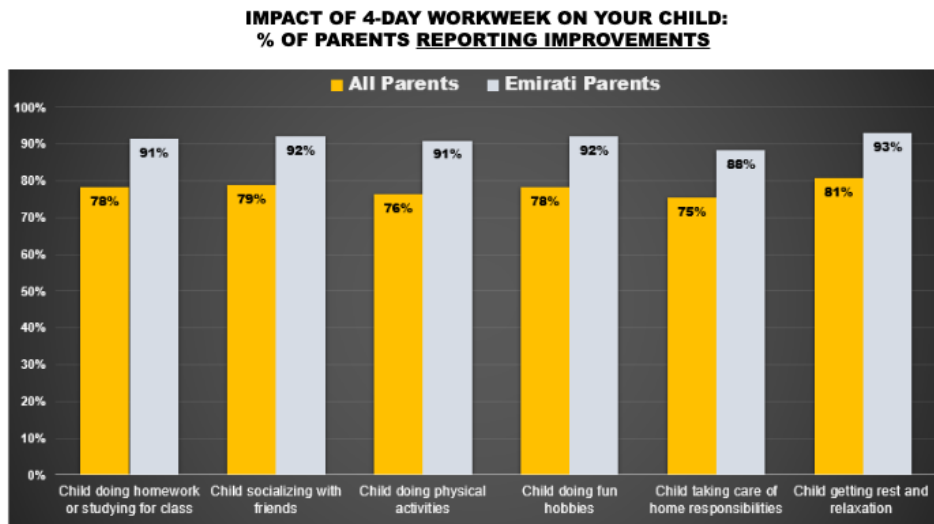
Figure 12: Impact of 4-day workweek on children improvement

In the survey, parents were asked to provide open-ended written comments on positive experiences and challenges. Out of 76,212 words of text provided, and through the below word cloud, which helps to visualize the most common/repeated words within the open-end questions. the majority of most frequent words relate to aspects of family, rest, and happiness. There is a general sense that the four-day week has allowed students to be more self-directed in their leisure time, and that their overall physical and emotional health has seemed to improve.

Figure 13: Parent's positive experience

In terms of challenges noted, out of 74,508 total words in the dataset, the majority relate to aspects of time management, whereby students struggle to figure out how to adapt to a lengthened or more intensive day, or that they lose touch with school during the long weekend and do not manage their time well.

Figure 14: Parent's challenges

Overall, the four-day week has been perceived positively by parents, despite the concerns over time management and exhaustion from the lengthened school day. SPEA attaches great importance to working side by side with schools in adapting school hours with the requirements of the different curricula. Parents reported strong levels of agreement for the 4-day workweek / 3-day weekend, providing very positive, impactful and transformational benefits with respect to enhancing the quality of life and wellbeing of the family.

School Employee Survey Results

Key findings among school employees indicate high satisfaction of the 4-day workweek, citing such qualities as work-life balance, wellbeing, and happiness. For example, 91% reported improved work-life balance and improved happiness. 87% indicated that the four-day week has a positive impact on their ability to exercise or go to the gym.

Figure 15: Impact of 4-day workweek on teacher

Employees also indicated readiness and adaptiveness of students, rating highly such aspects as the "student daily attendance in school." Slightly lower, but still reported at 81%, is impact on student homework load and projects.
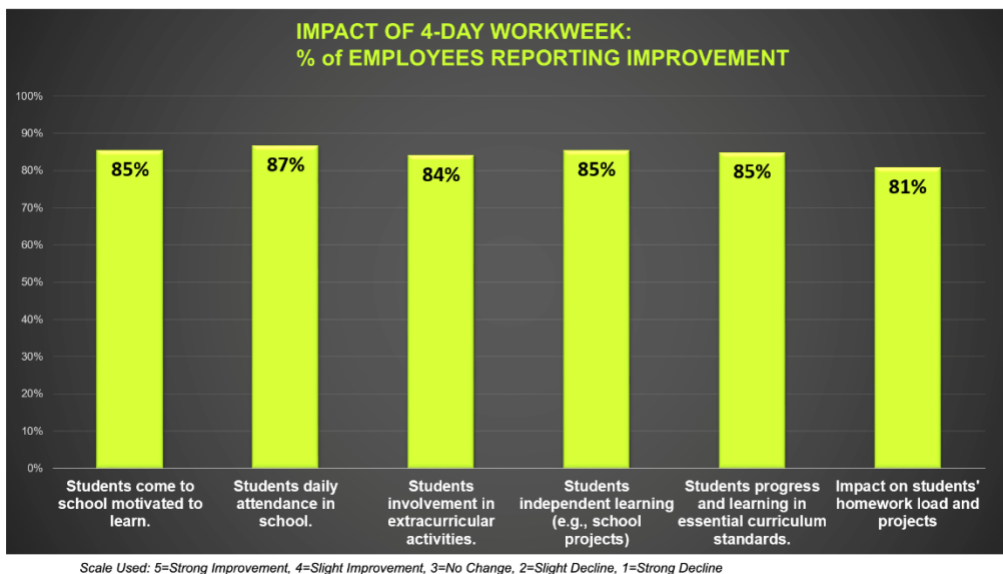
Figure 16: Impact of 4-day workweek on teacher

Among work-related factors, school employees rated their level of motivation for work highly (88%), along with management of work priorities, level of work productivity, and ability to achieve objectives (all at 86%). Rated lower are aspects of time pressure: educators reflected less confidence in their ability to complete professional development (83%), time to prepare lessons (80%), and reduced pressure on teaching (64%).
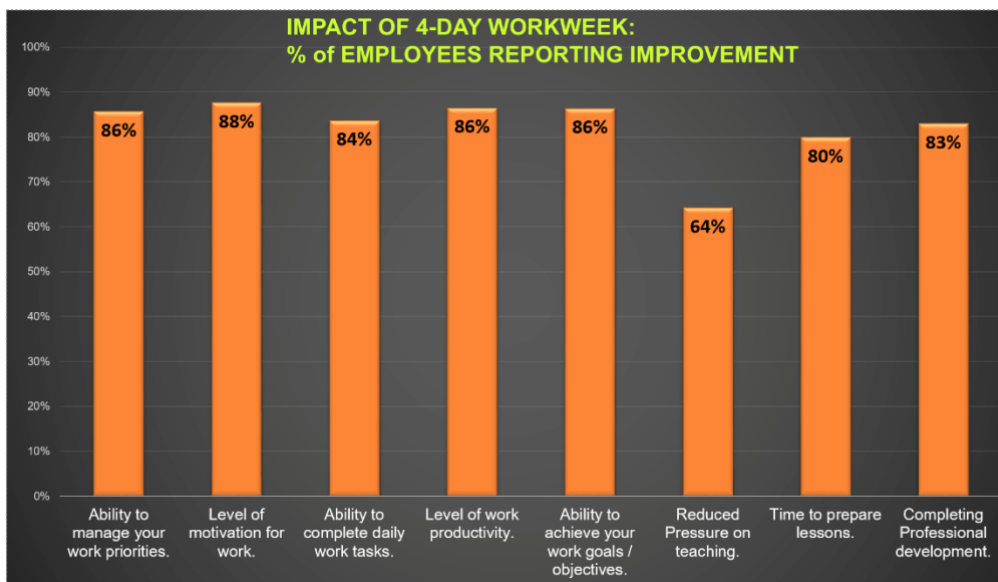
Figure 17: Impact of 4-day workweek on teacher

Nearly 5% of surveys indicated, within the open-ended written responses, that they struggle to teach all the curriculum or complete tasks. Over 5% reported that extra work is assigned to them over the weekends, and that long working hours or lack of time within the day can be a challenge (7%). Some teachers report that they do not benefit from the three-day weekend, as

they are required to go to school for additional work over the weekends. This is a crucial indicator for SPEA, showing the not all the curricula are agile enough to adapt to the 4-day workweek and awareness and transformation is needed to align with the new direction.

It is clear that with all the increased pressures, employees are highly aware of the value trade-off and therefore report a positive impact overall. The response from school employees gives us very clear recommendations. Schools will need to continue working to identify ways to increase productivity among employees within the working days, as the data show that not allowing teachers to benefit from the three-day weekend may impact wellbeing, stress, and possibly teacher turnover. Key aspects of professional development for managerial aspects of school organization may assist in this regard.

Implications

The four-day work week implemented in Sharjah's private schools has yielded positive results related to the wellbeing of individuals. Eighty-five percent of students and 79.9 % of teachers reported improved level of wellbeing. The recognition of this impact on their wellbeing reflected increased level of happiness and higher degree of engagement within the educational system. On the other hand, the increased level of wellbeing was countered by another adverse measure that some schools have adopted which required school employees to report to school on some weekends to carryout planning, professional development and other non-instructional chores.

The results extend beyond wellbeing to the development of profound trust in the Sharjah Private Education Authority by 90.2% of parents and 96.1% of teachers, thus suggesting an enhanced sense of community collaboration and support. The positive impact on schools is not merely anecdotal. For example, the formal ITQAN school performance reviews during the 2022-2023 school year showed an improvement of 68% of reviewed schools. Improved wellbeing and school's ability to effectively adapt to the new reduced workweek cannot be taken outside of the context of all other variables that contributed to the overall school improvement and students' achievement of learning outcomes. These results paint a compelling portrait of success, where such data undeniably indicates the significant potential of the four-day workweek in the educational landscape of Sharjah as well as in redefining work-life balance while optimizing educational outcomes.

Conclusions and Recommendations

The surveys conducted by the Sharjah Private Education Authority on the transition to the four-day week have provided valuable insight into the needs that schools, parents, students, and teachers have, as well as the positive impacts they have experienced. The following broad conclusions are drawn from the study:

1. Parents and teachers alike report that they, and their students, have an improved quality of life as a result of the shift to the four-day week. It has permitted more leisure time, reduced household expenses, and had positive effects on physical and mental health.
2. Parents and teachers alike recognize that new time management skills are needed among students, both in school and at home.
3. The transition to the four-day week has put new pressures on teachers and students that did not exist before, at the same level of intensity. While these new pressures

have caused some concerns among teachers and parents, there is a comparable level of recognition that these challenges are balanced by the positive effects.

The conclusions of this study have shaped recommendations for schools, parents and teachers, as well as for the Sharjah Private Education Authority and the Sharjah Education Academy. They are as follows:

1. Promoting extra-curricular activities and partnerships: raising awareness of the importance of extra-curricular activities and building partnerships with the private sector to explore, develop and sponsor, creative and talented people. Additionally, encourage activities in different forms, to meet the needs of students according to their interest.

2. Planning and modern teaching methods: in partnership with international partners and with Sharjah Education Academy, SPEA can raise awareness on the importance of planning the school day, so that it does not affect the increase of working hours during the week.

3. Policies and enablers: spreading awareness among educational institutions, parents, and students, regarding SPEA's wellbeing framework, and how to empower the community to employ weekly vacation days to achieve effective and fruitful outputs.

4. Adopt smart and flexible teaching methods that allow the student to apply knowledge in an effective way, without affecting wellbeing or increasing school burdens.

5. Schools should emphasize time management skills among students. This starts with a recognition that quality learning will not occur when content is spread thin and addressed quickly. Valuable skills acquisition occurs through quality learning, not quantity. As such, schools must re-evaluate their goals if they feel they are unable to meet all their needs within the time they are given. This should not be seen as a reduction in school output, but rather an improvement in the overall quality and satisfaction of learning.

6. Schools must develop better procedures for management of staff time, so that all staff have an improved experience of the four-day week transition. When teachers do not have a chance to benefit from the three-day weekend, schools may lose out on the opportunity to retain a higher percentage of their excellent staff. This can be resolved through careful and collaborative planning.

7. Parents can take an active role in helping their children manage their personal time and promoting healthy behaviors, both during the four-day week and the three-day weekend. Trying new sports or participating in new out-of-class learning activities will have a positive effect on overall student performance, satisfaction, and development.

8. The Sharjah Private Education Authority will continue to monitor the perceptions of staff and parents, as well as the implementations of schools. From this monitoring, SPEA will be able to fine-tune any regulations to increase overall performance and the satisfaction of parents, students, and school staff.

9. The Sharjah Education Academy will offer training to teachers on promotion of time management skills among students, as well as evidence-based strategies for increasing learning quality within available teaching hours.

Acknowledgements

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Scaffolding to Support Self-Regulated Online Learning

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Abstract
Recognising that equipping students with digital literacy is crucial for them to navigate online materials and increasing student agency are both important educational goals in the future of learning, this study explored the use of scaffolding to design online learning experiences to support student self-regulated learning through an online course on solving Chemistry data-analysis questions that was developed for student self-study. The learning packages that were designed incorporated different types of scaffolding and strategies to support self-regulated learning, leveraging features in the online learning portal developed by the Ministry of Education, Singapore. The study was conducted in four secondary schools in Singapore. Data were collected from analysis of students' work responses on the SLS portal, pre- and post-test results, and a survey. Findings showed that students were highly responsive to the online learning experiences, which led to enhanced performance on data-analysis items. In addition, findings provided insights into the implications for supporting self-regulated learning when engaging secondary school students in an online learning environment.

Keywords: Scaffolding, Self-Regulated Learning, Online Learning

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Introduction

Information technology has become an integral part of our lives, with the use of education technology expanding so quickly in the current education landscape that the traditional mode of teaching and learning with solely paper and pen is no longer the norm. With this, equipping students with digital literacy skills is becoming increasingly important in schools. In Singapore, one of the desired outcomes of education is to nurture independent students with a sense of ownership of their learning (MOE, 2018) and schools can leverage the affordances of EdTech tools available in the Student Learning Space (SLS), an online learning portal developed by the Ministry of Education (MOE) to nurture self-regulated learning in an online learning environment.

Recognising that students at a younger age may not fully appreciate the learning intentions in online learning environments and may require more adult guidance, this study explored the teaching and learning of data analysis skills in the Secondary Chemistry curriculum through online self-regulated learning. The purpose is to gain insights into: (i) online learning of Chemistry data-analysis skills; (ii) leveraging on technology to scaffold student learning in an online environment and (iii) ways to better support students in online self-regulated learning.

Literature Review

Scaffolding and Zone of Proximal Development (ZPD)

Wood, Bruner and Ross (1976) first discussed the importance of scaffolding on the learners' capability in solving problems with the help of adults. Scaffolding is closely related to the learning theory of the Zone of Proximal Development by Vygotsky (1978) which explains that student, with the help of a more knowledgeable other, can perform more complex tasks than they would otherwise be capable of performing on their own. It is about what the learner cannot do, what the learner can do with assistance and what the learner can do unaided.

Greater use of education technology in recent years has added another dimension to how we understand scaffolding in the 21st century education. With technology, the child's interaction with a more knowledgeable adult and/or peer would now include interaction with the content in an online environment.

Scaffolding in Online Learning

In terms of types of scaffolding that are provide effective instructional support for learning in an online environment, Hanaffi, Land and Oliver (1999), and Jumaat and Tasir (2014) presented four types of scaffolding, namely the conceptual, metacognitive, procedural, and strategic scaffolding.

Conceptual scaffolding supports students cognitively to acquire knowledge and perform complex tasks independently that are within the zone of proximal development. This includes concept development, sequence of thought processes and breaking down of complex tasks.

Metacognitive scaffolding guides students to review and assess what they already know or what have learnt. It brings out awareness in learning, to reflect, review and assess how well they have learned, and take a moment to evaluate their progress in the course. Metacognition

is an important aspect in self-regulated learning, and metacognitive scaffolding provides opportunities for review, feedback and to support growth.

Procedural scaffolding guides students to utilise available resources, materials and tools to complete a task. Procedural scaffolding can play a critical role in ensuring that students can use the tools in the learning management system. This includes the instructions and navigating the Edtech tools in the online portal.

Strategic scaffolding provides guidance and structure about alternative solutions, strategies or options to complete a task, such as offering choices. It often refers to deploying the principles of differentiated instructions when guiding students in working on the task.

Self-Regulated Learning (SRL) and Motivation

Zimmerman (2015) noted how students become masters of their own learning processes. He defines self-regulated students as "metacognitively, motivationally, and behaviourally active participants in their own learning" (Zimmerman, 1990, p. 4). In the 21st century education, it is beneficial to ensure that students are equipped with self-regulated capabilities to empower them to learn for life.

Additionally, Lavi, Shwartz and Dori (2019) found a significant relationship between cognition, metacognition and motivation and self-regulated learning.
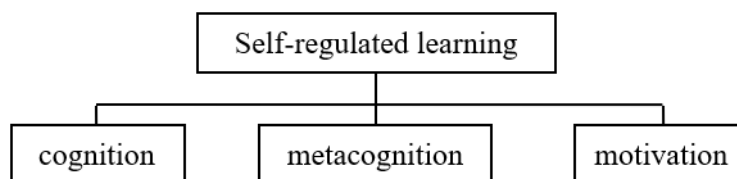
Lavi, Shwartz and Dori (2019)

Self-regulated learning occurs in the context of a task the learner is pursuing. Scaffolding is found to play a critical role in enhancing student efficacy and student motivation in learning (e.g., Darasawang and Wiriyakaru, 2013). This is because scaffolding increases the likelihood of student success, and challenges students through deep learning and discovery. Self-regulated learners view themselves as autonomous, competent and confident in their ability to perform. Competence can be supported in well-structured environments that allow for opportunities for growth, positive feedback, and challenges (Ryan and Deci, 2020).

Design of Self-Regulated Online Learning Experiences

The data-analysis in Chemistry online course was developed to enable students to acquire knowledge and skills to solve problems that require handling of information and interpretation in the Upper Secondary Chemistry curriculum. Consideration was given to the following essential elements to promote self-regulated online learning when designing this online course:
   (1) Cognition, using conceptual and procedural scaffolding to develop understanding and thinking processes in solving data analysis questions. For example, big ideas of each lesson, simple notes on each skills set, guiding questions, use of *interactive thinking*

      tools for crowdsourcing answers as well as the use of practices that mapped to the examples.

(2) Metacognition, tapping on EdTech features such as *tooltips, hints, automated feedback* that promote metacognition. Metacognitive scaffolding such as *reflection*, *think again* and *prompts* to check against success criteria to guide students in learning as the support opportunities for learning and growth.

(3) Motivation, sustaining student motivation and engagement so that they can fully benefit from the online learning. Principles of Differentiated Instruction and Self-Determining Theory were applied, such as setting respective tasks with multi-modal scaffolding (*videos, diagrams*) offering choices for different learning preferences (*audio or text*, *try first or go through example*), embedding checking in prompters on *challenges*, *encouragement* and *try again* messages.

The Chemistry data-analysis online course includes three lesson packages that are presented in the form of a learning guide. Each lesson covers specific skillsets and success criteria that were worked out from the key skills required in handling data and problem-solving:

      Lesson 1: Describing Trend and Relationship, and the Underlying Issues
      Lesson 2: Extracting Data for Calculations
      Lesson 3: Making Inferences and Deductions

Data Collection and Implementation

The target sample was Secondary Three students from Government secondary schools taking the Chemistry syllabus. The study was implemented in two cycles (i.e., with two batches of students) in four schools with a total of 263 students completed the pre- and post- tests that were administered.

Prior to attending the online course, the students completed a pre-test which covered the data-analysis skills they would learn in the online course. Following that, they were given a duration of about one school term (10 weeks) to complete the online course as part of their Chemistry learning process. Schools could decide if they would like to administer the online course as a fully student self-study module, or with handholding and monitoring by the teacher.

The objectives and timeline of the online course were shared with the students by their teachers. Students in School A were assigned the online course as a fully student self-study while students in schools B, C and D completed the online course with teacher check-ins every two to three weeks to address issues related to navigating the online materials or using the Edtech tools, without actual teaching of the content covered in the online course. Students could raise any challenges faced in the learning tasks while teachers provide self-regulated feedback to all via the learning portal. In-class lessons in class went on as per normal as the teaching and learning of other topics continued and students were given the ownership to decide on how they would plan to complete the assignment, with a recommended timeline given in the online course instructions. At the end of the online course, students had to complete the post- test that was administered.

A student perception survey was also administered separately to gather deeper insights on student engagement and motivation in self-regulated learning, including additional questions to seek students' input on ways to improve the learning experiences of the online course.

Result Analysis

Pre- and Post- Tests

The overall results of the pre- and post- tests are shown in Table 1:

Table 1: Overall Results for Pre- and post- test

Year	2021	2022
N	128	112
p-value	7.50×10^{-21}	1.99×10^{-15}
Cohen's d	0.88	0.89

The paired t-test p-value ≤ 0.05 shows that the intervention is statistically significant and the Cohen's d value > 0.8 indicates a large effect size. The results are consistent for the sample size of 263 students in the two cycles. This result shows that the online course is effectively supports the students' learning.

Individual school's pre- and post- test results were also analysed to gain deeper insights into the study and the details are in Table 2:

Table 2: Results for Individual School's Pre- and Post- test

2021				
School (N)	A* (36)	B (17)	C (41)	D (34)
p-value	2.48×10^{-4} (significant)	7.73×10^{-5} (significant)	9.49×10^{-10} (significant)	2.94×10^{-6} (significant)
Cohen's d	0.545 (medium effect)	0.869 (large effect)	1.08 (large effect)	0.933 (large effect)
2022				
School (N)	A* (28)	B (15)	C (28)	D (41)
p-value	6.25×10^{-4} (significant)	0.128 (non-significant)	6.17×10^{-9} (significant)	3.26×10^{-6} (significant)
Cohen's d	0.302 (small effect)	0.382 (small effect)	1.31 (large effect)	0.907 (large effect)

While students in School A completed the online course on their own with little teacher's guidance, the paired t-test result of School A still reflected a significant p value, with a medium effect in 2021 and a small effect in 2022. This means that the online course has a positive impact on students' acquisition of data-analysis skills despite minimal teacher's guidance. A non-significant effect and a small effect size were obtained for School B in 2022 due to a higher baseline in the pre- test, i.e., students were at a higher starting position and had some data-analysis skills before they started the online course.

The findings from additional data submitted by two other schools (School E and School F), which repeated the data collection process, showed consistent results as shown in Table 3.

Table 3: Results for Two Other Schools' Pre- and Post- test

2023		
School (N)	E* (36)	F (36)
p-value	4.20×10^{-4} (significant)	0.0823 (non-significant)
Cohen's d	0.573 (medium effect)	0.355 (small effect)

The results showed a consistency when students were given the online course to complete on their own with little to no teacher's guidance, the intervention is significant with small to medium effect size (School A in 2021 and 2022, and School E in 2023). While the consistency in the non-significant impact to students with a higher baseline in the pre-test was also clearly reflected in the results (School B in 2022 and School F in 2023).

Student Survey

The student survey that was administered focused on engagement and motivation in terms of students perceived value (V) and ownership (O) in completing the online assignment as well as the clarity (C), access (A) and rigour (R) of the online course in their learning. The results from student survey are collated in Table 4.

Table 4: Results for Students Perception Survey

No.	Question stem	% of students agree and strongly agree	
		2021 (N = 107)	2022 (N = 122)
1 (V)	I understand why I have to do the lesson packages.	98.1	94.3
2 (C)	The instructions in the lesson packages are easy to understand.	93.4	91.0
3 (C)	The success criteria are helpful for me to focus on what is required when answering the type of the questions.	91.6	94.3
4 (A)	The examples help me to understand how to answer the type of questions.	94.4	95.1
5 (R)	The number of practice questions are sufficient to help me learn the skills.	84.2	88.5
6 (R)	The practice questions are good challenges for me.	96.3	94.3
7 (A/C)	The automated feedback is helpful for me to think about how I can better answer the questions.	90.7	92.6
8 (V/O)	I am willing to spend time and effort to do similar lesson packages to learn and practice the skills in problem solving.	93.5	89.3

Results from the student survey showed that in general, the students understood the rationale of the online learning guide for self-study. They felt that the online course was pitched at the right level, was easy to understand and accessible. As such, the online course sustained student engagement, built student competence and confidence, and enhanced their motivation to learn.

Qualitative feedback showed students responded positively to the online course:

> *"It was simple and straight to the point where I can read and understand, then proceed to do on myself."*

> *"The examples on how to do the questions and then giving us the practice questions, which are similar."*

> *"... provided sufficient explanations…"; "videos with clear explanations."*

"Videos and guiding questions are very useful…"; "I liked the hints and examples…"

"I can do it at my own time and own target."; "At my own pace."

"[Can have] more examples on the different type of questions…"

Some examples of students' responses on self-regulated learning process (forethought, monitoring and evaluation) are as follows:

"Try to recall the methods shown [in the examples]."

"I would cross [reference] from the examples given or read the passage again."

"I struggled a lot, but I referred to the practice questions."

"I used the [suggested] answers to check what I may have omitted in my answer."

"I used the PEEL (point elaboration example link) method."

Overall, the online course was well-received by the students, and they were motivated to learn as they saw the value and purpose of the self-regulated learning online course. Regardless of their readiness (including those with higher pre-test baseline), students appreciated the online course in supporting them in acquiring knowledge and/or developing better understanding of answering data-analysis questions. All the data points provided good insights into effective instructional scaffolding to support online learning, which has a significant positive impact on student ability to answer data analysis questions.

Implications for Teaching and Learning

Some insights on good practices in supporting online self-regulated learning are distilled from this study:

(1) There must be clarity in terms of the role of the teacher.
In teaching and learning with technology, student-content interaction needs to be supported by student-teacher interaction to enhance students' learning. Even when setting an online course for students to learn independently, teachers still play an important role in supporting learning, especially for students at the secondary school level. This includes helping students to navigate the online learning materials, use of EdTech tools, helping students to review their learning process, and even sending reminders to complete the work may still be necessary. In addition, teachers need to be mindful of the affective domain of learning, especially to spend time to have conversation with the students on the purpose and learning goals, and checking in how with them on how they feel about the online learning and finding out any issues or challenges they are facing. By doing so, teachers can better guide students to close their learning gaps and increase their motivation by making the task more accessible and achievable.

(2) Student readiness must be considered.
An important consideration for developing students to be self-regulated learners for online learning is student readiness. From the feedback gathered, low readiness students require

additional help, more regular check-ins and teachers' guidance, such as pointing out concept development more explicitly to students and directing them to relevant examples for the practice questions. In addition, some students need more practice to be more confident in mastering the skills. Hence, if the online course is intended for students to acquire skills, teachers can supplement the course by providing more questions for students to check their understanding, while encouraging them to focus on growth and making progress in learning.

(3) Student agency as an outcome must be deliberately planned for self-regulation to take place.

Fostering greater student agency in learning can better sustain student engagement and cultivate good learning habits for students to fully benefit from the online learning. First, through scaffolding that providing successful experiences of mastering in an online environment, students gain confidence and competence, which helps sustain their motivation and engagement in the online tasks assigned. Second, providing opportunities to give students a voice in their learning preferences, such as allowing them to give input to improve the online learning materials, increases student ownership of learning. Teachers could gather feedback from students and make the necessary adjustment as students go through the online learning, instead of making modifications only at the end of the course. Third, student ownership towards self-regulated learning can be developed by guiding them to set goals to complete their assignments, monitor their own learning against the success criteria and self-evaluation of performance focusing on growth. Finally, a collaborative learning environment, where students can support each other and contribute to the discussion of a question or a part of the content from the online course, can be built in both the online learning environment or face-to-face setting.

(4) Technology can promote skills and content acquisition.

This study showed that students were able to develop data-analysis and problem-solving skills beyond the learning of chemistry content via online learning. The use of multimodal instructions such as *text*, *video* and *audio* provide a variation of scaffolding that caters for different learning preferences. Features of Edtech tools such as *interactive thinking tools*, *hints,* and *tooltip* provide metacognitive scaffolding to guide students in checking and monitoring their thinking process, thus helping to facilitate and deepen learning in the SRL process. All these expanded the possibilities to leverage the technology for the teaching and learning of Chemistry via online learning.

Conclusion

The findings from this study showed that providing effective instructional scaffolding supported students in self-regulated online learning. These findings concurred with the study by Baars, Khare and Ridderstap (2022) that effective instructional support is crucial in the SRL process, which include cognitive and metacognitive engagement as well as the importance of enhancing student self-efficacy supported by scaffolding in mastery of the learning.

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Code Switching Analysis: English Memes Reaction Video as the Supplemental Resources for Indonesian EFL Learners

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Abstract

In Indonesia, most English communication still happens only in classroom settings. It leads to ineffective English language learning for students. In order to be proficient in English, students need to have supplemental resources without depending only on the teachers in school. The utilization of social media can be very helpful in English language learning. In Indonesia, Mr. D is a well-known English teaching influencer with Instagram account and Youtube channel of gurukumrd. One of his Youtube contents is an English meme reaction. The use of memes is quite new for English teaching in Indonesia. His videos teach English grammar clarity, word choices, and cultural opinion in a humorous way. This study analyzed code switching types used by Mr. D on the meme reaction video. The use of code switching in educational settings is a common thing. Wardhaugh's theory was used to analyze the code switching types in the video. The types are divided into 2 (two), namely situational and metaphorical. The researcher used qualitative study based on content analysis. The results of the study showed that Mr. D used both types of code switching. The metaphorical (65%) is the dominant code switching type used by Mr. D, compared with the situation type (35%). The viewers showed positive attitudes (99%) towards the content through the comment box, making them more motivated to learn English. 1% showed a neutral attitude. In addition, the meme reaction could be a reference for English teachers in Indonesia to implement fun teaching in classroom settings.

Keywords: Code Switching, Reaction Video, Teaching English, Meme

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Introduction

Indonesia has English as a foreign language which is very different from the neighboring countries like Singapore, Hong Kong, and Malaysia. Those countries are using English as their second language (Sulistyo, 2015). In Indonesia, English learning happens mostly in the classrooms. The government inserts English in the national curriculum to be learned in formal education. English has become a compulsory subject in the elementary level. It proves that the government is very supportive towards English learning in Indonesia.

In fact, although many Indonesian students have been taught English even since kindergarten, they still find it difficult to master the language. Indonesian students face many difficulties in learning English, such as lack of language exposure (Farhani et al., 2020). They have no maximal exposure to the target language and minimal opportunities to interact with native speakers. Most Indonesian students only depend on teachers in schools in terms of English learning, whereas language learning should not only happen in a classroom setting. It will work more effectively if the students also add more resources outside the school. Social media can be very helpful in English language learning in Indonesia. It creates a sustainable and independent learning process (Lutfi, 2020).

Recently, more students are realizing the importance of English mastery in their social life. Many English learning resources are easily found on the internet. It is considered to complete the learning needs of students that cannot be obtained from the school. There are many influencers who are Indonesian or foreigners who focus on English language learning. They promote English learning through social media freely such as Instagram and Youtube. The social media account of gurukumrd is one of the influencers that is quite well known in Indonesia. It is managed by Mr. Danish or Mr. D. He comes from the United States and is currently living in Indonesia. Mr. D teaches English in a humorous way which makes him already has 1.4 million followers on Instagram and more than half million subscribers on Youtube. One of his content on Youtube is the English meme reaction. Memes in language learning are not new for English learners. Some studies showed positive results for the students' vocabulary memorization (Kayali & Altuntas, 2021) and creating happiness for students in classroom teaching (Reddy et al., 2020). Mr. D's meme reaction video is mostly delivering knowledge about English grammar clarity, word choices, and culture opinion. His reaction video can be defined as the innovative video teaching which can be an additional source for Indonesian students in English learning. Mr. D's contents are considered very communicative and engaging to his viewers, that is why this study wants to dig deeper into Mr. D video in terms of code switching use between Indonesian and English.

The linguistic phenomenon in bilingual and multilingual often called code switching. The use of code switching can be found in the forms of monologue or dialogue. Situational code switching and metaphorical code switching are the types of code switching (Wardhaugh, 2006). In the education setting, code switching used by the teachers is not new. Many studies have shown good results on impacting students' language learning. Code switching is frequently used in the educational process to aid in the students' comprehension (Mukti and Muljani, 2016) and to manage the classroom by showing solidarity or empathy (Gultom & Naibaho, 2021).

The researcher put the objectives of this study to understand the types of code switching employed by Mr. D on his video and how are the viewers/learners' perspectives towards the video based on the comments box section. To answer the objectives of the study, the

researcher conducted a study entitled "Code Switching Analysis: English Memes Reaction Video as The Supplemental Resources for Indonesian EFL Learners".

Theory

Wardhaugh's Code Switching Theory

The code switching theory used in this study is Wardhaugh's theory. The theory divided code switching into 2 (two) types which are situational and metaphorical (Wardhaugh, 2006).

The Situational Code Switching
It happens where the speakers change their language use depending on the certain situation. The speakers speak one language in one situation and deliberately change the language in different situations at the same time. Sometimes, even the code switching happens subconsciously by the speakers where they are not aware of the switching language activity.

Metaphorical Code Switching
It happens where the speakers do not only change the situation but require it to change the topic (Yosi & Sadia, 2019). Wardhaugh (2006) added the language changing from formal to informal, official to personal, serious to humorous, and politeness to solidarity.

Popularity of Memes and Reaction Video in Language Learning
Nowadays, the popularity of social networking sites is not only for entertainment purposes but also for communication (Garg, 2021). The popularity of memes on the internet is part of the communication among internet users. According to Oxford Learner's Dictionary (2022), meme can be defined as an image, video, or a piece of text containing humorous material which spread rapidly among internet users. In language learning, memes can be an enjoyable and beneficial material provided by the teacher to the students during the class. Kayali & Altuntas (2021) conducted a study in the College of Foreign Languages, Gazi University Turkey. According to the study, students' language memory was positively impacted by the use of memes. In addition, applying memes for language students emerges the creativity and engagement in their language learning. Teaching language with memes is not something new, various studies conducted in the classrooms related to the effect of memes. It concluded that memes are a useful supportive tool for the teaching process (Reddy et al., 2020).

The popularity of memes has created a new content category on Youtube namely meme reaction video. The studies about the use of Youtube videos in teaching EFL learners are very often to be conducted. The implementation of Youtube showed positive effects on the EFL learners' English acquisition (Cahyana, 2020) and the utilization of memes will boost EFL learners' motivation in language learning activity (Purnama et al., 2017). Thus, the researcher expects that the evolution of meme reaction video is considered to be useful to learners both in formal classroom settings or independent learning through the internet.

Methodology

This study was presented in qualitative research with descriptive content analysis. For analyzing qualitative data, a study often applies qualitative content analysis (Elo et al., 2014). Content analysis is conducted to identify the specific characteristics of materials such as video. This study used English memes reaction video of Guruku Mr. D's Youtube channel as the source of data. The video entitled "gurukuMrD Reacts: Meme Bahasa Inggris" that

published on May 2nd 2021. The researcher chose the video because Mr. D taught English in a humorous way through English memes reaction videos, which is rare to find on English learning in the formal classroom settings. Furthermore, the researcher expects that the code switching analysis of this video will give broader references to English teachers in Indonesia in terms of pedagogical skill. In addition, this video contains many switching languages that will support the data of this study.

The researcher collected the data through document technique. The document in this study is the transcript of Mr. D's Youtube video. The researcher applied some steps to collect the data, which are searching, downloading, watching, listening, and taking notes. The researcher used observational methods and media as the research instruments. The techniques of data analysis used by the researcher are familiarizing and organizing, coding and reducing, and interpreting and representing.

Finding

After analyzing the data, the researcher found that there are 2 (two) types of code switching used by Mr. D on the meme reaction video. The metaphorical type was used more dominantly than the situation type ones. The percentage of situational was 35% and metaphorical gained 65%. The details of findings are as follows:

No.	Type of Code Switching	Total	Percentage
1	Situational	6	35%
2	Metaphorical	11	65%

Table 1: Frequency of Code Switching Type Used

The meme reaction video of Mr. D drew the viewers/learners' attention. It could be identified by reading on his Youtube's comment box. The result showed 99% of viewers/learners have positive attitudes towards the video. 0% who showed a negative attitude and 1% showed neutral attitude towards the video. The details are as follows:

No.	Type of Code Switching	Total	Percentage
1	Positive	80	99%
2	Negative	0	0%
3	Neutral	1	1%

Table 2: Viewers'/Learners' Attitudes

Discussion

The Code Switching Types Used by Mr. D

The target audience of Mr. D is Indonesian learners where English is still a foreign language. That is why the code switching found in this study mostly was used to emphasize the meaning of topics and to show solidarity. The researcher discovered that Mr. D employed

both situational and metaphorical code-switching on his English memes reaction video. Based on the findings, the dominant code-switching type used was metaphorical type. This type of code switching allows the viewers'/learners to get a certain communicative effect that can be easier to be understood (Mukti & Muljani, 2016). One of metaphorical code switching used by Mr. D is shown below:

> *This is real life, ini bukan meme … Apa pentingnya nilai kalau banyak orang yang nilai bahasa Inggris passing … maybe not A … tapi passing, tapi nggak bisa bahasa Inggris, so apa pentingnya nilai? Yang penting bisa diajak ngobrol ya ….*

The utterance above showed the use of code switching in terms of persuading viewers/learners to have clear motivation for learning English. To achieve language learning goals, motivation is needed. Nerghes (2011) stated that the use of code switching enhances learners' motivation in digging more information related to the topic. The use of metaphorical code switching on the video focuses on engaging viewers/learners.

The researcher discovered many changing situations from serious to humorous on the video. In line with Wardhaugh's theory (2006), this language changing situation used by Mr. D was identified as a metaphorical code switching. The dialogue was taken from the video between Mr. D and a cameraman:

> *Mr. D : "WTF adalah singkatan!" (showing serious facial expression)*
> *A man : "Ya?"*
> *Mr. D : "WTF adalah singkatan!" (still showing serious facial expression)*
> *(No response)*
> *Mr. D : "You got it or it's not funny? Oke, gak lucu." (laugh together)*

The dialogue above allowed the cameramen and audience to start thinking together about the content at first. But, suddenly Mr. D changed his language into Indonesian to emphasize that his utterance is not funny at all. The code switching used here created a special communication between speaker and audience (Mukti & Muljani, 2016). In the teaching-learning process, the communication could enhance teacher and learners' chemistry which lead to motivation enhancement of learners.

The use of situational code switching was also found on the video. Mr. D talked with a man behind the camera during the video. The interaction became entertaining because of their mixed conversation of English and Bahasa Indonesia. One of situational code switching used is shown below:

> *Mr. D : What is bekas? Bekas is like a remake … left over?*
> *A man : Yes, secondhand.*
> *Mr. D : Oh, secondhand. Because mantan dalam bahasa Indonesia itu sifat … kata sifat …*

Based on the dialogue above, Mr. D switched from Bahasa Indonesia to English when communicating with a man behind the camera. After that, Mr. D switched again into Indonesian language when explaining to the viewers/learners.

In code switching, there are at least two languages that are involved. In this study, the code switching allows Indonesian and English used in the utterance. According to Mugo &

Ongo'nda (2017), code switching can be formulated by the presence of matrix language and embedded language. The matrix language may be recognized as the speaker's native tongue or as the language in which certain morphemes or phrases are used more frequently in speech. On the other hand, embedded language aids in finishing the formula's code switching example. In this study, the researcher discovered that the matrix language of Mr. D is Indonesian and the embedded language is English. Apart from the fact that Mr. D is an American who speaks English as a first language, but the communication style in his video stated differently.

In comparing independent learning through Mr. D's video and experiences of English learning in classroom settings, the researcher discovered similarity in terms of code switching implementation purposes. It is also firmly believed that teachers' code-switching is a successful teaching method when dealing with students who have little English proficiency (Ahmad & Jusoff, 2009). In conclusion, mostly the main purpose of code switching used on the video is for viewers'/learners' comprehension. The material comprehension creates a good English learning output for learners.

The Viewers'/Learners' Attitudes Toward the English Memes Reaction Video

In the twenty-first learning century, English material resources can be obtained anywhere and anytime in the world through technology. The use of English internet memes in language learning created humor and decreased learners' anxiety (Harshavardhan et al., 2019). The statement is in line with this study result where English memes are used by Mr. D to teach Indonesian EFL learners through his Youtube. Most of the Youtube's viewers showed a positive attitude toward the content. The indication of a positive attitude can be explored more on his Youtube's comment box. Most of the viewers/learners expressed their feelings after watching the video, such as happy and craving more English meme reaction in their English language learning journey. The researcher discovered viewers also provided answers on questions asked by Mr. D on the video. It showed that the learning process was very engaging with the viewers.

The researcher found a viewer/learner's comment left on the common box which indicated the neutral attitude. It was written in Javanese language as follows:

Figure 1: Neutral attitude found on Mr. D's YouTube

The meaning of the comment above was "not understand, but I am laughing" and it was categorized as neutral. It was because the viewer did not show a positive advantage towards the video in terms of English learning comprehension. In addition, he also did not mention any negative words after watching the content. It proves the use of memes gives a broader perspective in drawing Indonesian viewers'/learners' attention. The comment indicated that even he did not understand the material, but he enjoyed the meme reaction video. In education settings, memes can be a tool to provide extensive materials for teacher and student

communication (Dongqiang et al., 2020). In conclusion, memes stimulate students' enthusiasm and initiative to participate more in the English language learning process.

Conclusion

The use of code switching is often found in the EFL classroom and it gives a positive effect to the learners. English video meme reaction is something new for English language learning in Indonesia. The content contains many code switching utterances between Indonesian and English. The findings revealed 2 (two) types of code switching used which are metaphorical and situation. The metaphorical type (65%) was used more dominantly than the situation type (35%). The result of the study also revealed 99% of Mr. D's viewers showed positive attitudes towards the content and 1% of them had a neutral attitude. There is no negative attitude found during the study. The data can be identified from the comment box on his Youtube channel. Most viewers/learners showed excitement and craved for more video content like this. The researcher concluded the English meme reaction video enhances EFL learners' motivation to learn more into English. The motivation emerges from the learners' curiosity in participating more to learn. In addition, the method can be a reference for English teachers to implement fun teaching in classrooms through memes.

Future study should explore further on the teachers' code switching implementation on other social media, such as TikTok. The reason is because of the popularity of TikTok recently, particularly among Indonesian youngsters. The use of memes in English learning topics also needs further exploration to various levels of learners, from young learners until adult learners. This study did not dig more on how code switching used by the educator could facilitate the learners in terms of material comprehension. Therefore, future studies should explore more the effects of code switching used on other supplemental resources for Indonesian EFL learners.

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Determinants of Career Adaptability of Undergraduates in Malaysia

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Abstract
Career adaptability refers to adapting to changing tasks and engaging in continued self-learning. It is crucial to respond to the changing demands of employers. Undergraduates are the future talents of a country. Their readiness to join the dynamic labour market is essential to be examined. Thus, this study examines the factors affecting career adaptability among undergraduates in Malaysia. This study uses an online questionnaire for data collection purposes. The questionnaire includes career adaptability, decision-making self-efficacy, proactive personality, and academic performance. After filtering the responses received, the regression analysis consists of 171 responses from undergraduates. Results show that career decision-making self-efficacy, proactive personality, and academic performance positively relate to career adaptability. This study found that career decision-making self-efficacy and proactive personality significantly influence career adaptability. The findings in this study recommend universities encourage undergraduates to participate in extracurricular activities to have the opportunities to enhance their decision-making skills and develop their ability to take initiative.

Keywords: Career Adaptability, Career Decision-Making Self-Efficacy, Proactive Personality, Academic Performance

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1. Introduction

The evolution of technology has brought about rapid shifts in employment structures, impacting the present generation. Technology is one of the critical components in various economic activities in today's modern world, especially in the digital world. The industry is transforming technologically, altering our living and working styles. With technology, the Fourth Industrial Revolution (IR 4.0) is reshaping how we live, work, and communicate. Its rapid change is unprecedented. IR 4.0 radically changes traditional industries, which rely on centralized factories, vast workforces, and huge organizations (Economic Planning Unit, 2021).

While technology has the potential to generate new job opportunities, it also can eliminate large numbers of jobs (Mashelkar, 2018). According to a survey by the McKinsey Global Institute, the demand for specific advanced IT and programming skills is projected to surge by as much as 90% between 2016 and 2030. These skills are integral to IR 4.0, requiring workforces to significantly enhance their technical proficiency to remain competitive in an increasingly automated and digitalized economy. Furthermore, acquiring basic digital skills is imperative in navigating the landscape of IR 4.0 (McKinsey & Company, 2018). As the technological landscape evolves, workers must adapt to change and proactively cultivate the skills necessary to thrive in a highly dynamic and technologically driven economy.

Over the past few years, Malaysia has witnessed robust economic growth, but a shift in the economic structure has contributed to a notable increase in unemployment. The transformations in economic structures and industrial activities have not only reshaped the composition of occupations in the labour market but have also left a discernible impact on the education sector. In 2021, Malaysia observed a significant rise of 4.7% in graduates, with a total of 5.61 million individuals graduating compared to 5.36 million in 2020. The number of graduates in the labour force also experienced a 4.6% increase, reaching 4.77 million in 2021, compared to 4.56 million in the preceding year. Despite these shifts, the graduates' labour force participation rate (GLFPR) remained at 85.0%, as reported in the previous year (Department of Statistics Malaysia, 2022a).

New graduates often encounter challenges securing suitable employment, particularly during economic crises, and are more susceptible to job mismatches and underemployment. Job mismatch arises when individuals are compelled to accept positions that do not align with the skill level corresponding to their educational qualifications. In Malaysia, the skill-related underemployment rate witnessed a 6.3% increase, equivalent to 114.6 thousand persons, reaching 1.9 million persons in 2021, up from 1.8 million in 2020. Consequently, the rate of skill-related underemployment for employed individuals with tertiary education rose from 38.0% in 2020 to 38.7% in 2021 (Department of Statistics Malaysia, 2022b). This surge is primarily attributed to the lack of experience in career planning and job exploration among new graduates and an overreliance on academic performance. Additionally, they may lack the soft skills and adaptability required to navigate the job market during economic downturns.

The cultivation of high career adaptability among university students in Malaysia is paramount, as it equips them to navigate the dynamic and ever-changing job market. In a rapidly evolving global economy, individuals must possess the skills and adaptability to navigate new environments and situations, ensuring continued relevance in the workforce. Numerous studies underscore the significance of career adaptability in augmenting employability and fostering career success among undergraduates. However, there is a

growing concern that many university students in Malaysia lack the requisite career adaptability skills to confront these changes and thrive in the labour market effectively.

Despite the critical importance of career adaptability, research indicates that Malaysian university students exhibit low levels of this crucial skill, resulting in adverse career outcomes such as unemployment, underemployment, and job dissatisfaction. Notably, Malaysian university students demonstrate a moderate level of career adaptability, characterized by higher levels of career concern, confidence, and control (Guan et al., 2013).

Numerous factors influence career adaptability, encompassing personality traits, decision-making self-efficacy, and the impact of career guidance (Savickas & Porfeli, 2012). A comprehensive understanding of these factors is pivotal for universities and policymakers in developing effective career development programs. By addressing these aspects, educational institutions can enhance students' career adaptability, better preparing them for the dynamic and evolving labour market. Hence, the central research question driving this study is: What factors significantly affect the career adaptability of undergraduates?

The outcomes of this study offer valuable insights for policymakers and educators, guiding how to effectively equip undergraduates to confront the challenges of a rapidly evolving labour market. This information is a foundation for universities to craft targeted career guidance programs and formulate policies to enhance students' career adaptability. Such initiatives have the potential to diminish instances of underemployment and contribute to overall improvements in Malaysia's labour market outcomes.

By fostering high levels of career adaptability among graduates, universities play a pivotal role in nurturing individuals who can significantly impact the country's economic growth. Graduates with solid career adaptability are well-positioned to drive innovation, enhance productivity, and create new job opportunities. As a result, these proactive measures benefit individual graduates in navigating their careers and contribute to Malaysia's broader economic landscape. The collaborative efforts of policymakers, educators, and institutions can thus pave the way for a more resilient and thriving workforce better prepared to meet the demands of an ever-changing employment landscape.

2. Literature Review

Career development is an important aspect to investigate in an individual's life. It involves the process of exploring various career opportunities and making informed choices. Two theories that explain how individuals make career choices are Career Construction Theory (CCT) and Social Cognitive Career Theory (SCCT). According to CCT, individuals have varying capacities and willingness to adapt to change. Career adaptability is the ability of an individual to deal with current and future challenges in their work roles. Career adaptability consists of four self-regulatory strengths: concern, control, curiosity, and confidence (Savickas, 1997; Savickas & Porfeli, 2012).

SCCT explains how an individual makes career choices based on self-efficacy, goal selection, outcome expectations, and environmental factors. Self-efficacy is an individual's belief about their ability to achieve certain performance levels in specific tasks. A person with a high level of self-efficacy towards a particular task is more likely to exhibit interest in performing the task, demonstrate persistence in the face of obstacles, and potentially achieve success. The Career Decision-making Self-Efficacy Scale developed by Taylor and Betz (1983) is the most

used instrument to evaluate individuals' levels of self-efficacy. It comprises 25 items that measure five dimensions, including self-appraisal, occupational occupation, goal selection, planning, and problem-solving. Given its relevance to evaluating university students' career adaptability, this scale has gained significant popularity among researchers and practitioners alike (Taylor & Betz, 1983).

Previous studies on career decision-making self-efficacy show a positive relationship between self-efficacy and career adaptability among higher education students (Duffy, Douglass, & Autin, 2015; Ebenehi, Rashid, & Rahim, 2016; Rudolph, Lavigne, & Zacher, 2017; Shin, Lee, & Seo, 2019).

Besides career decision-making self-efficacy, individuals must also be ready to take action to improve their career circumstances (Savickas, 2013). This aspect can be understood through the concept of proactive personality. A proactive personality refers to an individual's tendency to take the initiative to influence their environment. Proactive persons are more likely to effectively navigate career-related changes by identifying opportunities for improvement and creating an environment that aligns with their goals (Bateman & Crant, 1993; Seibert, Crant, & Kraimer, 1999).

3. Methodology

This study used a survey method in a quantitative research design to gather data from undergraduates in Malaysia. The questionnaire was distributed using Microsoft Forms and consisted of four sections. The sections in the questionnaire include the first section – demographic information; the second section – career adaptability (CA); the third section – career decision-making self-efficacy (CDMSE); and the fourth section – proactive personalities (PAP). The analyses conducted in this study included a reliability test, a Pearson correlation test, and multiple linear regression.

The CA scale used the 24 items from Savickas and Porfeli (2012), CDMSE refers to the 25-item scale by Betz, Klein, and Taylor (1996), and PAP used the 17-item scale from Bateman and Crant (1993). This study used a 5-point Likert scale to measure CA, CDMSE, and PAP. The academic performance refers to Cumulative Grade Point Average (CGPA). The scale scores of all variables were summed up and converted to 100%.

Figure 1 shows the research framework of this study. CA is the dependent variable, while CDMSE, PAP, and CGPA are independent variables in this study.
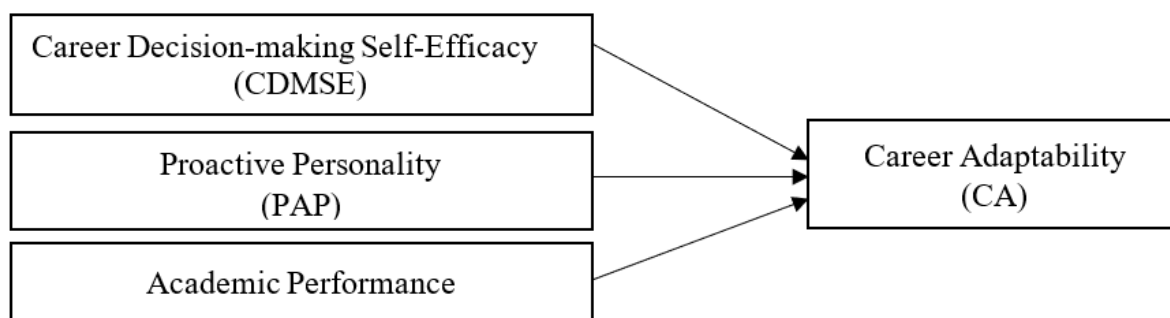
Figure 1: Research Framework

4. Data Analysis

The demographic composition of the participants revealed that 45% of respondents were in their first or second year of undergraduate studies, while 55% were in their third or fourth year. This distribution across academic years provides a balanced representation, capturing insights from students at different stages of their undergraduate journey.

As depicted in Table 1, the results revealed exceptionally high Cronbach's Alpha values. Specifically, the CA, CDMSE, and PAP measures demonstrated strong internal consistency, with Cronbach's Alpha values of 0.945, 0.931, and 0.962, respectively. These high values underscore the reliability and stability of the instruments, affirming the consistency in measuring the targeted constructs. The analysis unveiled a mean score of 78.47 for undergraduate CA. Notably, the standard deviation for PAP was 15.66. This variation indicates the degree of dispersion in responses, offering insights into the diversity of perceptions among participants, particularly regarding PAP.

Examining the correlation patterns among the variables, the findings presented in Table 2 elucidated significant relationships. A positive correlation between CA and PAP implies that individuals with higher career decision-making self-efficacy and proactive personality tend to exhibit greater career adaptability. A positive correlation emerged between CA and CGPA, indicating that those with higher career adaptability scores tend to perform better academically.

Table 1: Reliability Test

Variables	Cronbach's Alpha
CA	0.945
CDMSE	0.931
PAP	0.962

Table 2: Mean, Standard Deviation, and Correlation

Variables	Mean	Standard Deviation	CA	CDMSE	PAP
CA	78.465	11.509	1		
CDMSE	71.620	11.161	0.585***	1	
PAP	70.812	15.664	0.365***	0.423***	1
CGPA	78.708	10.868	0.146	0.099	0.180**

Note: ***$p < 0.01$, **$p < 0.05$

The study's primary objective was to unravel the factors that significantly influence the career adaptability of undergraduates. This study achieved the objective through multiple regression analysis, briefly summarizing the outcomes in Table 3. The examination of different model configurations provided nuanced insights into the relative impact of CDMSE and PAP on CA.

In Model 1, both CDMSE ($\beta = 0.522$, $p < 0.01$) and PAP ($\beta = 0.132$, $p < 0.1$) demonstrated a positive association with Career Adaptability (CA). The beta coefficients signify the strength and direction of the relationships, indicating that higher levels of CDMSE and PAP are associated with increased levels of CA. The significance levels (p-values) below 0.05 suggest that these associations are statistically robust.

Model 2, which excluded CGPA due to its insignificance in Model 1, revealed a strengthening of the impact of both CDMSE (β = 0.524, p < 0.01) and PAP (β = 0.144, p < 0.05) on CA. This model refinement allowed for a more focused examination of the core variables, emphasizing their robust contributions to predicting CA.

Models 3 and 4 delved into the individual effects of CDMSE and PAP, respectively. These models revealed that both factors exerted even stronger influences on Career Adaptability, with a beta coefficient of 0.585 (p < 0.1) for CDMSE and 0.365 (p < 0.1) for PAP. The elevated beta coefficients suggest that when considered in isolation, both CDMSE and PAP play substantial roles in shaping the levels of Career Adaptability among undergraduates. The results affirm the importance of CDMSE and PAP in contributing to the nuanced construct of CA among the study participants.

The regression models employed in this study underscored that CDMSE and PAP emerged as the predominant factors significantly influencing the career adaptability of undergraduates. Notably, the beta coefficients provided a quantitative measure of the strength and direction of these influences, with CDMSE exerting a more significant impact (β = 0.585) compared to PAP (β = 0.365).

The substantial influence of CDMSE is highlighted by the higher beta coefficient (β = 0.585), indicating a more pronounced contribution to the variation in CA. It suggests that as undergraduates perceive themselves as more productive in making career decisions, their levels of career adaptability are likely to be elevated. The finding aligns with the notion that a heightened sense of self-efficacy in career decision-making empowers individuals to navigate the complexities of their professional journeys with increased adaptability and resilience.

Simultaneously, the positive association between PAP and CA, as indicated by the beta coefficient of 0.365, emphasizes the relevance of taking initiative and being proactive in shaping one's career trajectory. Undergraduates with higher scores in proactive personality traits demonstrated a heightened level of career adaptability, underlining the importance of a proactive mindset in fostering adaptive behaviours in the face of evolving career landscapes.

These results resonate with previous research studies (Duffy, Douglass, & Autin, 2015; Ebenehi, Rashid, & Rahim, 2016; Guan et al., 2016; Rudolph, Lavigne, & Zacher, 2017; Shin, Lee, & Seo, 2019; Ebenehi et al., 2016; Karacanozdemir & Yerin Guneri, 2017). The consistency across these findings validates and reinforces the robustness of the outcomes of the current study. The alignment with prior research enhances the study's credibility and contributes to the broader understanding of the pivotal role played by CDMSE and PAP in shaping CA among university undergraduates.

<div align="center">Table 3: Regression Results</div>

	Model 1	Model 2	Model 3	Model 4
CDMSE	0.522	0.524	0.585	
	(7.663)***	(7.689)***	(9.374)***	
PAP	0.132	0.144		0.365
	(1.912)*	(2.105)**		(5.101)***
CGPA	0.070			
	(1.117)			
R-square	0.364	0.359	0.342	0.133
R	0.603	0.599	0.585	0.365
F value	31.828	47.047	87.877	26.018

Note: Standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

5. Conclusion

This study concluded that career decision-making self-efficacy and proactive personality significantly influence undergraduates' career adaptability. They are positively related to career adaptability. The analysis in this study found that undergraduates with higher confidence in career decision-making are better prepared to face the challenges in labour after completing their undergraduate studies. Regression results also show that undergraduates possessing a proactive personality have a higher chance of attaining job positions. This study recommends that universities encourage undergraduates to join more extracurricular activities such as organizing activities. Joining extracurricular activities provides opportunities for undergraduates to take on leadership roles and develop confidence, decision-making skills, and the ability to take initiative.

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From Kente Cloth to Tapestry Art: Exploring the Intricacies of Cultural Hybridity

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Abstract
This study explores the concept of cultural hybridity through an examination of the similarities and differences between Kente cloth and medieval tapestries. Drawing on examples from Ghanaian and European cultural heritage, the study investigates the ways in which traditional art forms can adapt and evolve through cross-cultural exchange. The study highlights the intricate designs and patterns found in both Kente cloth and medieval tapestries, and suggests that these similarities reflect a process of cultural exchange and adaptation. Through an analysis of the historical and cultural contexts in which these art forms emerged, the study demonstrates the unique complexities of cultural hybridity and the potential for cross-cultural dialogue. Overall, the study emphasizes the importance of exploring the intricacies of cultural hybridity in understanding the exchange of traditional art forms. It suggests that a deeper understanding of the similarities and differences between cultural artifacts can lead to new forms of artistic expression and cultural understanding, and can promote a more inclusive and diverse cultural heritage for future generations.

Keywords: Kente Cloth, Tapestry Art, Cultural Hybridity, Cross-Cultural Exchange, Artistic Innovation

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1. Introduction

The study focuses on the concept of cultural hybridity in the exchange of traditional art forms, with a specific focus on Kente cloth from Ghana (Figure 1) and medieval tapestries from Europe (Figure 2) Cultural hybridity refers to the process of cultural exchange and adaptation that occurs when different cultures come into contact with one another (Bhabha, 1994). This concept has become increasingly relevant in the context of globalization and the growing interconnectedness of cultures around the world.

According to Appiah (1991), cultural hybridity has long been a feature of human history, as different cultures have interacted and borrowed from one another throughout time. The exchange of traditional art forms is one example of this process, as artists and communities have adapted and innovated upon traditional techniques and designs in response to new cultural and historical contexts.

According to Bhabha (1994), cultural hybridity is a complex process that occurs when different cultures intersect and interact with one another. It involves the negotiation of cultural differences and the creation of new forms of cultural expression that reflect the unique histories and traditions of each culture. Cultural hybridity can occur in a variety of contexts, including the exchange of traditional art forms, the adaptation of cultural practices and beliefs, and the formation of new cultural identities.

The study of cultural hybridity in the exchange of traditional art forms is significant for several reasons. First, it highlights the importance of cross-cultural dialogue and understanding in the preservation and promotion of cultural heritage. By exploring the similarities and differences between traditional art forms from different cultures, we can gain a deeper appreciation for the diversity and richness of cultural expression around the world.

Second, the study of cultural hybridity can lead to new forms of artistic expression and innovation. When artists and communities adapt and innovate upon traditional techniques and designs in response to new cultural and historical contexts, they create new forms of cultural expression that reflect the unique histories and traditions of each culture.

Finally, the study of cultural hybridity has important implications for the promotion of cultural diversity and inclusivity. By recognizing the value and significance of traditional art forms from different cultures, we can promote a more inclusive and diverse cultural heritage for future generations.

Figure 1: Kente Cloth

Figure 2: Medieval Tapestries

2. History of Kente Cloth and Medieval Tapestries

Kente Cloth and Its Historical Significance

Kente cloth is a traditional Ghanaian fabric that is woven using brightly coloured threads in intricate patterns. According to oral tradition, Kente cloth was first woven by the Ashanti people of Ghana in the 17th century (Ross, 2014). The fabric was originally made from silk and reserved for use by royalty and other members of the elite. Over time, Kente cloth became more widely available and was used in a variety of contexts, including religious and cultural ceremonies, as well as everyday wear (Padilioni, 2017).

Kente cloth is known for its intricate designs and patterns, which often feature symbolic motifs that represent concepts such as wisdom, bravery, and unity. The colours used in Kente cloth also have symbolic meaning, with each colour representing a different concept or emotion (Padilioni, 2017).

Today, Kente cloth is an important symbol of Ghanaian cultural identity and is recognized around the world as a powerful expression of African heritage. It is often worn during special occasions, such as weddings and funerals, and is considered a valuable cultural artifact.

Medieval Tapestries and Their Historical Significance

Medieval tapestries are large, woven textiles that were produced in Europe during the Middle Ages. Tapestries were often commissioned by wealthy individuals or institutions and were used to decorate important buildings and spaces (Campbell, 2013). They were also used as a form of political propaganda, with many tapestries depicting scenes from mythology, religion, and history that conveyed specific messages about power and authority.

Medieval tapestries are known for their intricate designs and patterns, which often feature realistic depictions of people and animals, as well as detailed landscapes and architectural elements (Rex, 2013). They were woven using a variety of techniques, including wool and silk, and were often embellished with gold and silver thread.

Today, medieval tapestries are considered valuable cultural artifacts and are housed in museums and galleries around the world. They provide a window into the artistic and cultural practices of medieval Europe and offer insights into the political and social structures of the time.

Comparison of the Two Art Forms

While Kente cloth and medieval tapestries originated in very different cultural contexts, there are some interesting similarities and differences between the two art forms. On the one hand, both Kente cloth and medieval tapestries are known for their intricate designs and patterns. Kente cloth is characterized by bold, geometric patterns and bright colours, while medieval tapestries often feature realistic depictions of people and animals, as well as detailed landscapes and architectural elements (Rex, 2013). Both art forms often convey symbolic meaning through their designs, with Kente cloth using motifs to represent concepts such as wisdom and unity, and medieval tapestries using scenes from mythology and history to convey messages about power and authority (Campbell, 2013).

On the other hand, there are also some significant differences between Kente cloth and medieval tapestries. Kente cloth is a relatively lightweight fabric that is often used for clothing and accessories, while medieval tapestries are large, heavy textiles that were used primarily for decoration (Rex, 2013). Additionally, while Kente cloth is made using a handloom, medieval tapestries were often produced using a more complex form of weaving that involved multiple weavers working together on a single piece (Campbell, 2013).

3. Cultural Significance of Kente Cloth and Medieval Tapestries

Symbolism and Meaning in Kente Cloth

Kente cloth is known for its rich symbolism and the intricate meanings woven into its patterns and designs. The patterns and colours used in Kente cloth often represent specific concepts or emotions, and are deeply rooted in Ghanaian cultural traditions (Padilioni, 2017). For example, the Adwinasa pattern (Figure 3), which features a diamond shape with a cross inside, is associated with the concept of "greatness" and is often worn by chiefs and other

important figures. The Fathia Fata Nkrumah pattern (Figure 4), which features a stylized image of a sword, is associated with the concept of "freedom" and was created to commemorate Ghana's independence from colonial rule in 1957 (Padilioni, 2017). The colours used in Kente cloth also hold symbolic significance. For example, blue is often associated with "peace" and "harmony," while green represents "growth" and "renewal". Red is associated with "blood" and "sacrifice," while yellow represents "wealth" and "royalty" (Padilioni, 2017).

In all, the symbolism and meaning woven into Kente cloth reflect the values and beliefs of Ghanaian culture, and provide insights into the history and traditions of the Ashanti people.
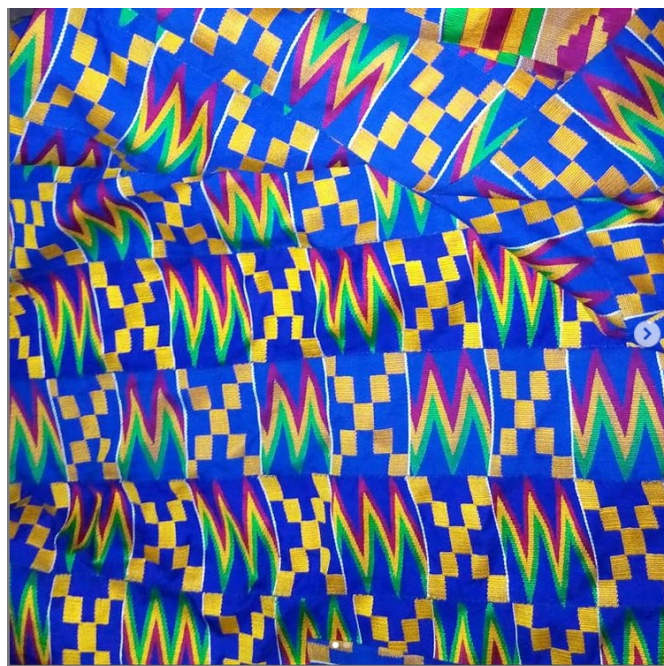
Figure 3: Fathia Fata Nkrumah pattern

Figure 4: Adwinasa cloth

Symbolism and Meaning in Medieval Tapestries

Medieval tapestries often feature intricate designs and scenes that are rich in symbolism and meaning. Many tapestries are commissioned by wealthy individuals or institutions and are used to convey political and social messages (Campbell, 2013). For example, the famous Lady and the Unicorn tapestries (Figure 5), created in the late 15th century, feature a series of six tapestries that depict a lady and a unicorn in various settings (Campbell, 2013). The tapestries are rich in symbolism, with each tapestry representing one of the senses, and the final tapestry representing "A Mon Seul Desir," or "to my only desire" (Campbell, 2013). The tapestries are often interpreted as a representation of courtly love, with the lady and the unicorn representing the lovers and the various scenes representing their journey together.

Other tapestries, such as the famous Bayeux Tapestry (Figure 6), depict historical events and convey specific messages about power and authority (Rex, 2013). The Bayeux Tapestry, created in the 11th century, depicts the events leading up to the Norman Conquest of England in 1066 (Rex, 2013). The tapestry is rich in symbolism, with each scene conveying a specific message about the events and the people involved. For example, the scene depicting the Battle of Hastings shows King Harold being struck by an arrow in the eye, a symbolic representation of his defeat and the triumph of the Norman army (Rex, 2013).

Figure 5: Lady and the Unicorn tapestries

Figure 6: Bayeux Tapestry

Overall, the symbolism and meaning in medieval tapestries provide insights into the historical and cultural context of the time, and offer a glimpse into the artistic and political practices of medieval Europe.

Comparison of Cultural Significance

Kente cloth and medieval tapestries are both highly valued for their cultural and historical significance. However, they hold different cultural meanings and are valued in different ways. Kente cloth is an important symbol of Ghanaian cultural identity and heritage. It is often worn during special occasions, such as weddings, funerals, and other important ceremonies, and is considered a valuable cultural artifact (Padilioni, 2017). Kente cloth is also regarded as a symbol of African cultural heritage and is recognized around the world as a powerful expression of African identity and creativity.

Medieval tapestries, on the other hand, are highly valued as historical artifacts that provide insights into the artistic and cultural practices of medieval Europe. They are often displayed in museums and galleries as examples of the artistic achievements of the time, and are regarded as symbols of wealth and status (Rex, 2013; Campbell, 2013).

To conclude, while both Kente cloth and medieval tapestries hold significant cultural and historical value, they are valued in different ways and reflect the unique cultural traditions and practices of their respective societies.

4. Cross-Cultural Exchange and Adaptation

Cultural Exchange Between Ghana and Europe

The cultural exchange between Ghana and Europe has a long and complex history that spans several centuries. European contact with Ghana dates back to the 15th century, when Portuguese explorers first arrived on the coast of West Africa (Owusu-Ansah, 2013). Over time, European powers established trade relationships with Ghanaian kingdoms, leading to the exchange of goods, ideas, and cultural practices.

During the colonial period, Ghana became a British colony and was subjected to a variety of cultural and political influences from Europe. European missionaries played an important role in spreading Christianity in Ghana and introducing Western education and cultural practices (Owusu-Ansah, 2013). At the same time, Ghanaian culture continued to evolve and adapt in response to these new influences, leading to the emergence of new forms of cultural expression.

In recent years, there has been a growing interest in the exchange of cultural practices between Ghana and Europe. Many Ghanaian artists and musicians have gained international recognition for their work, and there has been a renewed interest in traditional Ghanaian art forms such as Kente cloth (Padilioni, 2017). At the same time, Ghanaian cultural practices have also influenced European culture, with elements of Ghanaian music, fashion, and art appearing in European popular culture.

The cultural exchange between Ghana and Europe has been complex and multifaceted, with both positive and negative aspects. While European influence has had a significant impact on Ghanaian culture, Ghanaian cultural practices have also influenced European culture in important ways.

Incorporation of Kente Cloth Designs in Medieval Tapestries

We make a valid point that Kente cloth, which emerged in Ghana centuries after the medieval period, could not have directly influenced medieval European tapestries due to timing (Edusei, 2006). As Kemp (2012) notes, tapestry production flourished in Europe between the 12th-16th centuries CE. However, broader African textile influences on Europe are plausible over the longue durée of cultural contacts. As Goody (2010) discusses, trans-Saharan trade networks existed from antiquity, opening channels for the diffusion of sub-Saharan craft traditions northward. While evidence is limited, subtle stylistic adaptions are possible (Monson 2012).

From the 15th century onwards, the surge of European exploration and colonialism in Africa "brought about profound transformations in cultural exchanges" (Mudimbe 1988, p.127). Travelers, missionaries and colonists encountering diverse African weaving techniques may have transmitted some influences (Glassman 1995). The colonial era, when European powers controlled much of West Africa, involved intensive social and economic interactions conducive to creolized cultural forms emerging on both sides of the colonial divide (Gilroy 1993). Textile artisans experimenting with hybrid styles offer one plausible pathway for African influences on European production during this period of heightened contact (Ferguson 2003).

In contemporary globalization, renewed interest in cultural heritages has supported revivals fusing historical African and European influences (Crowley 2005). While direct borrowing of Kente motifs seems unlikely for medieval tapestries, Africa's broader role in the gradual evolution of European textile traditions remains a possibility given multi-directional diffusion over centuries of interconnectivity (Chilver 2013).

Adaptation and Innovation in the Exchange of Traditional Art Forms

The exchange of traditional art forms between cultures has often led to adaptation and innovation, as artists and artisans incorporate new ideas and techniques into their work. This

has been true in the exchange of traditional art forms between Ghana and Europe, as well as in other cultural contexts.

For example, the exchange of ideas and techniques between Ghanaian weavers and European textile producers has led to the emergence of new forms of textile production that incorporate elements of both Ghanaian and European traditions (Padilioni, 2017). Similarly, the exchange of musical ideas between African and European musicians has led to the emergence of new forms of music that combine elements of both traditions.

This process of adaptation and innovation is often driven by the desire to create new and exciting forms of expression that reflect the unique cultural traditions and practices of different societies. It is also driven by the desire to learn from and be inspired by other cultures, and to create new forms of cultural exchange that promote mutual understanding and respect.

The adaptation and innovation that occurs in the exchange of traditional art forms is a reflection of the dynamic and evolving nature of culture, and highlights the importance of cultural exchange in promoting creativity and innovation.

5. Similarities and Differences in Design and Technique

Analysis of Design and Technique in Kente Cloth

Kente cloth is known for its intricate designs and bold colours, which are created using a complex weaving technique that involves multiple steps and the use of specialized looms (Padilioni, 2017). The designs woven into Kente cloth are rich in symbolism and meaning, and often reflect important cultural concepts and values.

One of the key features of Kente cloth is the use of geometric patterns and shapes, such as squares, diamonds, and triangles. These shapes are often combined in intricate and complex ways, creating designs that are both visually striking and deeply meaningful. The use of bright colours is also an important aspect of Kente cloth, with each colour holding symbolic significance. For example, red is often associated with blood and sacrifice, while yellow represents wealth and royalty.

The weaving technique used to create Kente cloth is highly specialized and requires a great deal of skill and precision. The cloth is woven on a narrow strip loom, with each strip measuring between four and six inches wide. The strips are then joined together to create a larger piece of cloth, with the designs and patterns aligning perfectly across the seams.

In all, the design and technique used in Kente cloth reflect the unique cultural traditions and practices of the Ashanti people, and demonstrate the level of skill and artistry involved in traditional African textile production.

Analysis of Design and Technique in Medieval Tapestries

Medieval tapestries are known for their intricate designs and rich colours, which were created using a variety of weaving techniques and materials. Many tapestries were made using wool, silk, or a combination of both, and were decorated with intricate designs and scenes that conveyed specific messages (Campbell, 2013).

One of the key features of medieval tapestries is the use of perspective and depth, which was achieved by using a variety of weaving techniques, such as shading and hatching (Campbell, 2013). This allowed tapestry makers to create realistic and dynamic scenes that conveyed a sense of movement and action.

The designs woven into medieval tapestries were often highly symbolic, conveying messages about power, authority, and social hierarchy. Many tapestries depicted scenes from mythology, religion, or history, and were used to decorate important buildings and spaces, such as churches and castles (Campbell, 2013). The designs often included intricate details and imagery, such as animals, plants, and architectural elements, which added to the richness and complexity of the tapestries.

The weaving technique used to create medieval tapestries was highly specialized and required a great deal of skill and precision. Tapestry makers often worked in teams, with each person responsible for a different aspect of the weaving process (Campbell, 2013). The designs were often created using a cartoon, or full-scale drawing, which was then transferred onto the loom, where the weavers would work from the bottom up, creating the design row by row.

Overall, the design and technique used in medieval tapestries reflect the unique artistic traditions and practices of medieval Europe, and demonstrate the level of skill and artistry involved in tapestry production during this time period.

Comparison of Similarities and Differences

Kente cloth and medieval tapestries are both highly valued for their intricate designs and rich symbolism. However, there are also important differences between the two forms of textile art.

One similarity between Kente cloth and medieval tapestries is the use of intricate designs and patterns. Both forms of textile art often depict complex scenes and imagery that convey specific messages and meanings. Additionally, both Kente cloth and medieval tapestries are created using highly specialized weaving techniques that require a great deal of skill and precision.

However, there are also important differences between the two forms of textile art. Kente cloth is made using a narrow strip loom and is often created using bright colours and geometric patterns, while medieval tapestries are often larger in size and were created using a variety of materials, such as wool and silk (Campbell, 2013). Additionally, while both forms of textile art hold significant cultural and historical value, they are valued in different ways and reflect the unique cultural traditions and practices of their respective societies.

In summary, while Kente cloth and medieval tapestries share similarities in their intricate designs and weaving techniques, they also reflect important differences in their materials, size, and cultural significance.

6. Implications of Cultural Hybridity in Traditional Art Forms

Importance of Cultural Hybridity in Preserving Traditional Art Forms

Cultural hybridity, or the blending of different cultural practices and traditions, can play an important role in preserving traditional art forms. By incorporating new ideas and techniques

into traditional art forms, artists and artisans can create new and innovative works that reflect the changing cultural landscape.

One example of the importance of cultural hybridity can be seen in the evolution of Kente cloth. While Kente cloth has a long and rich history in Ghanaian culture, it has also evolved over time to incorporate new patterns, colours, and weaving techniques (Padilioni, 2017). This has allowed Kente cloth to remain relevant and vibrant, even as cultural practices and traditions change.

Similarly, the exchange of cultural practices between different societies can also provide new opportunities for the preservation of traditional art forms. By sharing their artistic traditions and practices with other cultures, artists and artisans can gain new insights and perspectives that can help them to adapt and innovate in new and exciting ways.

The importance of cultural hybridity in preserving traditional art forms highlights the dynamic and evolving nature of culture, and the role that creativity and innovation play in ensuring that traditional art forms continue to thrive and evolve over time.

Potential for Cross-Cultural Dialogue and Understanding

The exchange of cultural practices between different societies can also provide opportunities for cross-cultural dialogue and understanding. By sharing their artistic traditions and practices with other cultures, artists and artisans can foster greater appreciation and understanding of different cultural perspectives and practices.

For example, the exchange of cultural practices between Ghana and Europe has led to a greater appreciation of traditional Ghanaian art forms, such as Kente cloth, in European art circles (Padilioni, 2017). This has helped to promote greater understanding and appreciation of Ghanaian culture and heritage, while also encouraging dialogue and exchange between different cultural communities.

Similarly, the exchange of musical ideas between African and European musicians has led to the emergence of new forms of music that combine elements of both traditions, promoting greater understanding and appreciation of different cultural practices.

It is obvious to understand that, the potential for cross-cultural dialogue and understanding that arises from the exchange of cultural practices highlights the important role that cultural exchange plays in promoting mutual respect, understanding, and appreciation between different cultural communities.

Implications for Future Generations

The exchange of cultural practices and the preservation of traditional art forms has important implications for future generations. By promoting greater understanding and appreciation of different cultural practices, future generations can learn to value and respect diverse cultural perspectives and traditions. For example, by preserving traditional art forms such as Kente cloth, future generations can gain a greater understanding of the cultural heritage and history of the Ashanti people of Ghana (Padilioni, 2017). This can help to instill a sense of pride and appreciation for one's cultural heritage, while also fostering greater understanding and respect for the cultural traditions of others.

Similarly, by promoting cross-cultural dialogue and exchange, future generations can learn to value and respect the perspectives and traditions of different cultural communities. This can help to promote greater social cohesion and understanding, while also fostering a sense of global citizenship and responsibility.

In all, the implications for future generations highlight the important role that cultural exchange and the preservation of traditional art forms play in promoting mutual respect, understanding, and appreciation between different cultural communities.

7. Conclusion

In conclusion, this study explores cultural hybridity by comparing Kente cloth and medieval tapestries. It shows how these traditional art forms adapt through cross-cultural interactions, highlighting their shared designs and patterns as evidence of cultural exchange. By analysing historical and cultural contexts, the study reveals the complexities of cultural hybridity and its potential for cross-cultural dialogue. Understanding the nuances of cultural hybridity can lead to new artistic expressions, cultural comprehension, and a more inclusive cultural heritage for future generations.

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Challenges and Recommendations to Champion Breastfeeding Teachers in Albay

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Abstract

In today's modern world, it is equally significant for the mothers to nurse their babies and pursue their jobs. However, working mothers specifically teachers face initial challenges when they chose to breastfeed and return to work. In the Philippines, Republic Act No. 10028 (2009) otherwise known as Expanded Breastfeeding Promotion was implemented to support breastfeeding employees through establishment of lactation area and the practice of 40-minute lactation period at work. However, not all workplace is implementing the law. This research was a mixed qualitative and quantitative type of study. A quantitative approach through a survey questionnaire using a five-point Likert scale assessed the challenges faced by the 15 mothers who continued breastfeeding their babies after their maternity leave in Albay. A qualitative approach deepened the understanding of these challenges to come up with proposed recommendations through open-response questions in the survey. Descriptive statistics and qualitative content analysis were utilized to analyze the data. Two main challenges were identified in the workplace: lack of time (2.67) and lack of lactation area (2.93). Most breastfeeding teachers experienced inflexible working schedule and inaccessible lactation area in schools. Despite the challenges, they were supported by their co-teachers (4.33) and supervisors (3.67) by covering their duties and giving them constant moral support. The Department of Education (DepEd) with the help of school supervisors/principals must monitor the implementation of flexible work schedule, improvised lactation area, and inclusive guidelines in schools throughout Albay to fully create a supportive working environment for the breastfeeding teachers.

Keywords: Breastfeeding, Challenges, Philippines, Recommendations, Teachers

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Introduction

Decades of research prove that breastfeeding is best for babies up to two years of age. Breastfeeding for six months or longer create indisputable benefits both for the infant and mother (Lawrence, 2022). Thus, it is important for the mother to give the best source of food to her baby through breastfeeding. It is equally significant for the mothers though to nurse their babies and pursue their jobs. According to Whipps & Honoroff (2019), maternal return to employment outside the home shortly after birth is inevitable for some families. Although the benefits of breastfeeding are strong, most mothers are unable to continue breastfeeding upon returning from maternity leave due to different challenges at work (Harrington, et al., 2022).

Benefits of Breastfeeding

There are long-term benefits of breastfeeding both for the mother and the child. Primarily, it is the first preventive health measure that can be given to a child at birth because breastmilk contains all the essential nutrients suitable for the infant's needs (Department of Education [DepEd], 2010). It also has nutrients and enzymes that could fight infection at an early age so researchers have repeatedly demonstrated the recommendation of breastfeeding over formula feeding in most cases (Lena, 2018). Its health benefits to the infant such as lower risk of gastroenteritis, diarrheal illnesses, urinary tract infections (UTIs), sepsis, and respiratory infections are always underscored (Al-Katufi et al., 2020). Hence, it is an important public health strategy for improving infant and child morbidity and mortality (Al-Binali, 2012). Furthermore, UNICEF Philippines (2017) stated that breastfeeding mothers have lower rates of breast and ovarian cancer, two leading causes of death among women.

Breastfeeding has been widely researched to bring forth more advantages beyond the health benefits. The skin-to-skin closeness that occurs during breastfeeding promotes bonding and attachment between mother and infant as well which led to increased efficiency of breastfeeding and enhanced neurological and psychosocial development of the infant (Bettinelli, 2012). It also boosts the morale of mothers because breast-fed babies are inclined to be more healthy or immune from sickness (Department of Labor and Employment [DOLE], 2014). Lastly, it alleviates poverty, promotes economic growth, and ends inequalities globally (UNICEF Philippines, 2017). Despite the notable benefits of breastfeeding, it continues to be a tough challenge for working mothers.

Breastfeeding Challenges at Work

A working mother face initial challenges when she chose to breastfeed and work full-time. Bettinelli (2012) stated that return to work is a well-known recognized factor that has been associated with diminished breastfeeding frequency and duration. Given the increasing number of women in the workforce, the workplace is a fundamental setting of intervention to support women who face challenges such as early cessation of breastfeeding once they return to work (Vilar-Compte et., al. 2021).

Indeed, some of the mothers are conflicted with their roles as a mother and as a member of the labor force. Lawrence (2022) stated that it is undeniably difficult to give up equally significant roles at home and at work. However, working creates difficulties and presents challenges in continuing breastfeeding. One of these challenges is that they mistakenly think they cannot breastfeed if they plan to return to work, and thus they may not talk with their

employers about their intention to breastfeed or how breastfeeding might be supported at their workplace (Bettinelli, 2012). In addition, few workplace environments are supportive of breastfeeding employees and employer perspectives toward breastfeeding remain discouraging (Stewart-Glenn, 2012). Even with the presence of lactation rooms, there were reported problems of their availability and accessibility to teachers and poor quality (Hentges & Pilot, 2021). Harrington, et al., (2022) added that lack of time, lack of space, and unsupportive work culture remain as challenges at work of breastfeeding employees.

In a study conducted by Al-Binali (2012), adverse work-related issues were one of the main reasons for a very low rate of exclusive breastfeeding among female school teachers in Saudi Arabia. Seeing that teachers can be found in the classroom most of the time at work and may have additional duties beyond the class hours, a breastfeeding teacher may find it more challenging to schedule pumping/nursing breaks. Based on Hentges & Pilot (2021) study, many teachers reported difficulties in creating time for breastfeeding where fixed schedules overlapped with lactation breaks. Thus, Philipps (2020) added that workplace climate in schools can be unfavorable for the demands of breastfeeding.

Breastfeeding Support for Teachers

Breastfeeding mothers in the academic field specifically teachers face various challenges at work. For mothers who choose to return to work postpartum, there are alternative options to breastfeeding such as pumping/expressing milk or breastfeeding the infant during breaks (Phillips, 2020). Way back 2009, this was highly supported by the passing of the Republic Act No. 10028 (2009) otherwise known as Expanded Breastfeeding Promotion Act. It stated that one way to support the exclusive breastfeeding movement in the workplace is to have a lactation room for breast pumping and milk storage. Establishment of lactation stations equipped with facilities for hand-washing and refrigeration and with electrical outlet and comfortable seat is required in non-health institutions (Department of Education [DepEd], 2010). With this initiative, literature shows that working mothers who have access to lactation facilities tend to be more productive as they feel less guilty of working full-time while providing one of the essential needs of their babies (Department of Labor and Employment [DOLE], 2014). This kind of intervention in the workplace is important in protecting, promoting, and supporting breastfeeding among working mothers (Vilar-Compte et., al. 2021).

A lactation period not less than 40 minutes in addition to the regular time-off for meals to breastfeed or express milk is also practiced in the Philippines (Department of Education [DepEd], 2010). Being the first law to provide paid breastfeeding breaks, its implementation should be closely monitored in the workplace throughout the country (World Health Organization, [WHO], 2015). This measure gives the breastfeeding mothers ample time to express milk in the workplace without worrying about their work schedule. An initiative like this which prioritizes the practical merging of breastfeeding and work is essential in optimizing the benefits of breastfeeding and supporting the employee (Lawrence, 2022). In addition, providing time for expressing milk in the workplace improved job satisfaction of employees (Jantzer et., al. 2018). Through these adequate policies, the right of women to combine motherhood and professional development would be fulfilled (Vilar-Compte et., al. 2021).

In combination with the implementation of sound policies, the sincere support of the co-workers could also impact the breastfeeding success of working mothers. According to Vilar-

Compte et., al. (2021), feeling comfortable and supported in breastfeeding or breast pumping in the workplace is essential in achieving successful breastfeeding goals at work. Indeed, the presence of a lactation room, implementation of lactation breaks, co-workers' support, and adoption of policies in the workplace all play a vital role to champion breastfeeding teachers.

Being a breastfeeding teacher myself, this research has a special place in my heart. The outcome of this study will be significantly beneficial to champion the essential role of women especially mothers as the primary source of nutrition of their babies. It will also empower mothers to do their best amidst balancing roles as a parent and a professional. Lastly, it will encourage the government and private sectors to support the advocacy of breastfeeding and/or breast pumping in the workplace. Therefore, the objectives of this study were to discuss the breastfeeding challenges and find possible recommendations to support teachers in Albay achieve their breastfeeding goals. Specifically, it aimed to:
   a. Identify the breastfeeding challenges of teachers
   b. Determine ways to support breastfeeding teachers
   c. Propose possible recommendations to address the challenges and support breastfeeding teachers

Methodology

This research was a mixed qualitative and quantitative type of study. The same research methodology was done in Stewart-Glenn (2012) and Phillips (2020) studies. A quantitative approach through a survey questionnaire using a five-point Likert scale assessed the challenges faced by the participants. A qualitative approach deepened the understanding of these challenges to come up with proposed recommendations through open-response questions in the survey. Descriptive statistics and qualitative content analysis were utilized to analyze the data.

Research Participants

The target participants were 15 mothers (Phillips, 2020; Hentges & Pilot, 2021) who continued breastfeeding their babies after their maternity leave. Given that the field of education is predominantly dominated by women, mothers who were working as full-time teachers with one child below the age of two (2) years were the chosen participants of this study.

Research Locale

The participants came from private and public schools in Albay. Given its strategic location in the Bicol Region as the gateway and urban province, most mothers here are expected to be involved in the workforce such as the academic field.

Research Instrument

Building upon the literature, the survey questionnaire was divided into two parts: a five-point Likert scale consisted of 10 questions and an open-ended section composed of three (3) questions. The questions in the first part were categorized into four themes: a) employee's perception as a breastfeeding mother b) employee's experiences in the workplace specifically work schedule and pumping area station c) employee's experiences with co-teachers' support; and d) employee's experiences with school head's support. In the second part, the questions

required a deeper explanation on the challenges and support that the participants had experienced in the workplace. The questions were adapted yet modified from Phillips (2020) study. Thus, a letter was sent to the author about the adaptation of the research instrument.

Data Gathering Procedure

The search for 15 target participants took a month last March 2023. They were selected through purposive sampling given that they were a unique sample as mothers who were in the minority of having experienced breastfeeding while working full time. A snowballing technique was also implemented as other eligible participants who might be interested in the study were recommended by initial participants. A consent form and initial conversation to build rapport with the participants was done first before the survey was distributed using email and/or Facebook. A short orientation about the objectives of the research and the data gathering procedure was also accomplished. The accomplished self-administered survey was collected and compiled in a span of one month.

Data Analysis

In the first part of the survey, descriptive statistics were used to analyze the quantitative data from the Likert scale (see interpretations below). On the second part of the survey, content analysis was used to analyze the open-ended responses (Hentges & Pilot, 2021).

Mean	Verbal Interpretation
4.20-5.00	Fully Agree
3.40-4.19	Agree
2.60-3.39	Neutral
1.80-2.59	Disagree
1.00-1.79	Fully Disagree

Results and Discussion

Fifteen breastfeeding teachers with diverse teaching experiences from two (2) cities (Legazpi and Tabaco) and one (1) town (Daraga) of Albay province participated in the study. On average, mothers were 32 years old and most of them were Junior High School teachers.

Breastfeeding Perceptions

Theme	Indicator	Mean	Verbal Interpretation
Perceptions as a mother and teacher	I am certain there is a place I could go to breastfeed or express breastmilk at work.	3.06	Neutral
	I am comfortable asking for help while breastfeeding or expressing breastmilk at work.	3.67	Agree
	I can talk about breastfeeding or expressing breastmilk at work.	4.2	Fully Agree

Table 1: Perceptions of Breastfeeding Teachers

Table 1 shows that the participants perceive their workplace as a secure and welcoming space for breastfeeding. They can openly share their thoughts and experiences in their breastfeeding journey at work with a mean rating of 4.2 and verbal interpretation of "Fully Agree."

However, they are not that certain if there is a proper place for breastfeeding or breast pumping at work. This finding concurred with the study of Harrington, et al. (2022) that lack of specific space for breastfeeding employees remains as one of the tough challenges at work.

Breastfeeding at Work

Theme	Indicator	Mean	Verbal Interpretation
Work Schedule and Pumping Area	My breaks are long and frequent enough to breastfeed or express breastmilk.	2.67	Neutral
	My breastfeeding or pumping area includes everything I need.	2.73	Neutral
	My breastfeeding or pumping area is in a private location and free of interruptions.	2.93	Neutral

Table 2: Breastfeeding Schedule and Area

In Table 2, most of the participants view their breaks at work as neither enough or insufficient to breastfeed or pump breastmilk with a mean rating of 2.67. Despite the demands of work, alternative options to breastfeeding such as pumping/expressing milk or breastfeeding the infant during breaks (Phillips, 2020) is still possible. Then again, many teachers in the study reported difficulties in creating time for breastfeeding where fixed schedules overlapped with lactation breaks (Hentges & Pilot, 2021).

Even with the initiative of Department of Education (DepEd) to release a memorandum in 2010 concerning the establishment of lactation rooms in the workplace, this stays as a major concern in schools throughout Albay. Many of the participants considered this as a major challenge at work with mean ratings of 2.73 and 2.93. Thus, all indicators regarding work schedule and lactation area in the workplace got a "Neutral" response which proves that this is one of the toughest challenges in their breastfeeding goals.

Breastfeeding Support

Theme	Indicator	Mean	Verbal Interpretation
Support from Co-teachers	My co-teachers support my breastfeeding goals.	4.33	Fully Agree
	My co-teachers cover my job duties if I need time to breastfeed or express breastmilk.	3.47	Agree

Table 3: Breastfeeding Support from Co-teachers

In terms of support from co-teachers in Table 3, the study garnered the highest mean rating of 4.33 with a verbal interpretation of "Fully Agree." Indeed, feeling comfortable and supported in breastfeeding or breast pumping in the workplace is essential in achieving successful breastfeeding goals at work (Vilar-Compte et., al., 2021). When it comes to their co-teachers covering their duties when they needed to breastfeed or pump, the mean rating was 3.47 which was a bit lower than the previous indicator mentioned above. It is noteworthy that workplace climate in schools can be unfavorable for the demands of breastfeeding (Philipps, 2020) even with the support of your colleagues.

Theme	Indicator	Mean	Verbal Interpretation
Support from Supervisors	My supervisor supports my breastfeeding goals.	3.67	Agree
	My supervisor helps me manage my workload so I could breastfeed or express breastmilk.	3.27	Neutral

Table 4: Breastfeeding Support from Supervisor

In addition, the participants received adequate support from their supervisors with a mean rating of 3.67 as shown in Table 4. But the help they get to manage their workloads was a bit lower at 3.27 mean rating. With manageable and/or flexible workload, they will have ample time for expressing milk in the workplace which will lead to improved job satisfaction (Jantzer et., al. 2018).

Indicator	Main Theme	Subtheme
What was the toughest challenge that you have experienced as a breastfeeding mom in your school?	Work Challenges	• Schedule • Lactation Area
What was the biggest support that you have received while breastfeeding or expressing breast milk in school?	Work Support	• Moral Support • Covering Duties
Can you name and describe polices related to breastfeeding or breast pumping that have been adopted by your school?	Work Policies	• Accessibility to Lactation Area • Lack of Policies

Table 5: Summary of Themes

The findings of the study identified themes and subthemes as illustrated in Table 5: (1) Work Challenges (2) Social Support (3) School Policies. These themes were applied to structure the findings and deepen the understanding on the challenges experienced by the participants and the support and policies they needed to help them succeed in their breastfeeding goals.

Work Challenges

Schedule

As teachers, these mothers faced unpleasant work-related issues such as a demanding work schedule which is one of the main reasons for a very low rate of exclusive breastfeeding (Al-Binali, 2012). Six (6) participants revealed their difficulty to breastfeed or pump milk during working hours. They cannot schedule breast pumping in between classes due to a lot of reasons such as handling preschoolers which require close attention, limited time during breaks, and doing paper works even after teaching in classrooms. One of them explained: "The toughest challenge I have experienced so far was my work time and schedule. There are times when I really need to breastfeed or express breast milk but I was not able to do it because I am still at work and should be with my pupils." This is also in consonance with Hentges and Pilot (2021) study wherein participants reduced the frequency, postponed, and skipped pumping sessions due to time issues. Clearly, a lactation period not less than 40 minutes in addition to the regular time-off for meals to breastfeed or express milk which

should be practiced in the Philippines (Department of Education [DepEd], 2010) was not properly exercised by the participants.

Lactation Area

Lactation facilities such as a designated area at work impact the mothers' ability to continue breastfeeding (Hentges & Pilot, 2021). Five (5) participants shared that there was no breastfeeding/pumping area in the workplace. According to them, finding a private and comfortable place to breastfeed was a huge challenge because there was no specific place for breastfeeding moms. The rooms available were inappropriate and have no privacy from students who usually needed consistent attention. One of the participants highlighted: "One of the challenges that I experienced as a breastfeeding mom is finding a private and comfortable place to breastfeed." This only demonstrates that the memorandum from DepEd, which mandates the establishment of lactation stations equipped with facilities for hand-washing and refrigeration and with electrical outlet and comfortable seat was not fully realized in most schools in Albay (Department of Education [DepEd], 2010). This challenge should be seriously addressed because this is also considered as the top intervention to support breastfeeding women in the workplace based on Vilar-Compte et., al. (2021) study.

Work Support

Moral Support

Most of the participants felt supported and secure in their workplace. Thus, a school can be considered as one of the few workplace environments that are supportive of breastfeeding employees (Stewart-Glenn, 2012). Six (6) mothers disclosed that their co-teachers are encouraging them to continue breastfeeding which made them felt good about themselves emotionally and mentally. In the words of one of the participants: "The biggest support I have received was moral support from my other colleagues who can fully understand my situation as a breastfeeding mom and that means a lot." This is similar with the results found in Philipps (2020) study where the participants responded favorably regarding overall co-worker support. They also received tips on how to increase their milk supply and reminders to pump on time and remain positive about being a breastfeeding mother. Hence, a workplace is certainly a fundamental setting of intervention to support women who face challenges such as early cessation of breastfeeding once they return to work (Vilar-Compte et., al. 2021).

Covering Duties

Apart from moral support, five (5) participants discussed positively how their co-teachers cover their duties whenever they are breastfeeding or breast pumping. One of them stated: "The biggest support that I have received while breastfeeding is the support from my co-teachers and principal. They attend to my class while I am breastfeeding." Their colleagues and even the principal is willing to attend to their class and give them consideration when they needed more time to complete their work while they are breastfeeding. One of the mothers also appreciated the gesture of letting her extend her breaks while she pumps milk and they attend to her class. This finding contradicts the study of Al-Katufi et al., (2020) which demonstrated deficient work support from colleagues as one of the top barriers in pursuing breastfeeding in the workplace. This might be a case of differences between two work cultures in the Middle East and Southeast Asia.

Work Policies

Accessibility to Lactation Area

Despite the lack of appropriate lactation area in the school, three (3) of the participants noted the initiative of their workplace to allow them to breast pump in the Faculty Room privately and in a designated small room. One of them added that she also had a flexible schedule and can go home early to breastfeed her child: "As to policies, there are none. The school pays consideration, however, to breastfeeding moms since they allow their employees to pump at faculty rooms and go home earlier (if work is done) to breastfeed their babies at home." This shows that some schools make use of the limited and available facilities to support the breastfeeding teachers. This initiative which prioritizes the practical merging of breastfeeding and work is essential in optimizing the benefits of breastfeeding and supporting the employee (Lawrence, 2022).

Lack of Policies

However, 11 out of 15 participants noted the lack of any policy in school supporting breastfeeding teachers. One of them narrated: "I guess there is no policy related to breastfeeding or breast pumping that has been adopted by our school. This kind of situation should be addressed and I guess everyone should be aware of the struggles of some breastfeeding moms that are working as public school teachers and weren't able to breastfeed and do milk pumping due to our work." Indeed, without the appropriate policies in place, the right of women to combine motherhood and professional development would not be fulfilled (Vilar-Compte et., al. 2021).

Conclusion

This research identified the practices that hinder breastfeeding of teachers after returning to work. The participants have had trouble breastfeeding/breast pumping at work due to two (2) major challenges: a) lack of time and b) lack of lactation area. In the middle of these challenges, they also received enough support in the workplace from their co-teachers and supervisors. With this, the following are the recommendations to overcome these challenges and support breastfeeding teachers in Albay:

A.　Flexible Work Schedule

Looking at the challenges of the participants, their work schedule remains as the top barrier to achieve their breastfeeding goals. It is recommended that the teachers should be well-informed about the Republic Act No. 10028 (2009) otherwise known as Expanded Breastfeeding Promotion Act which grants nursing employees paid break intervals not less than 40 minutes for every (8)-hour working period. Being mindful of this act would allow them to properly plan their work schedule and breastfeeding sessions. Though this is the first law to provide paid breastfeeding breaks, not all workplaces are implementing this law (World Health Organization, [WHO], 2015). Thus, it is important both for the teacher and supervisor/principal to be aware of this so proper guideline will be practiced in the workplace regarding breastfeeding employees.

One of the participants cited a flexible schedule granted to her as a breastfeeding mother. While this might be challenging for the supervisor, it is still feasible. For instance, a lunch

break can be extended to practice the 40-minute paid break or early out (after accomplishing the duties at work) can be implemented. Through this intervention in work schedule, protecting, promoting, and supporting breastfeeding among working mothers will be achievable (Vilar-Compte et., al. 2021).

B. Improvised Lactation Area

Another notable challenge is the establishment of proper lactation area in schools. Even with the presence of lactation rooms, there were reported problems of their availability and accessibility to teachers and poor quality (Hentges & Pilot, 2021).

Looking at the reality of education facilities in the Philippines, it is recommended to establish makeshift lactation area in schools. It is important to observe safety, cleanliness, and privacy in the designated area to ensure the good quality if not the ideal characteristic of a lactation area. With this initiative, literature shows that working mothers who have access to lactation facilities tend to be more productive as they feel less guilty of working full-time while providing one of the essential needs of their babies (Department of Labor and Employment [DOLE], 2014).

C. Inclusive School Guideline

As breastfeeding teachers, these mothers have the right to be provided with support and resources to perform their utmost duty as a mother and an educator. Given their responsibilities, it is unquestionably difficult to give up equally significant roles at home and at work (Lawrence, 2022). Through an inclusive school guideline, the co-teachers and supervisor/principal will work hand in hand to cater to the unique needs (such as lactation break and lactation area) of the breastfeeding teacher/s. As a result, the mother would feel included and valued at work and would see the school as a supportive working environment in her breastfeeding journey.

These critical needs of the mothers must be met and normalized so that the breastfeeding support for teachers will be institutionalized at the physical and organizational level (Hentges & Pilot, 2021). Amidst the difficulties, the Bicolano participants were supported by their colleagues which made things a lot easier for them to continue their breastfeeding goals. With this solid support and love, it is possible to establish proper guidelines in schools (both public and private) in Albay to champion breastfeeding teachers.

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Paths to Promote a Culture of Peace in Latin America: Qualitative Approach to Education in the 21st Century in the Gameleira Municipal Network – Pernambuco, Brazil

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Abstract

This study aims to explain Education in a Latin American educational conception, focusing on Paths for the Promotion of a Culture of Peace in Latin America, investigating Education in the 21st century in the Gameleira Municipal Network, based on public policies governmental frameworks, historical landmarks and academic publications, we aim to make a connection between 21st Century Education in Latin America and the actions developed by the Gameleira Municipal Network, in Basic Education in the Initial and Final Years of Elementary School, in a qualitative sampling of education in this modality. The general objective of this study is to understand Latin American Education in a historical and cultural context based on public educational policies linked to 21st Century Education in promoting the Culture of Peace in the municipality of Gameleira - PE; Among the specific objectives we have: relating Educational Public Policies through 21st Century Education and the role of schools in promoting a culture of peace using the Gameleira Municipal Network as a qualitative analysis, within the scope of Elementary Education in Final Years and Initial Years; Verify the extent to which the pedagogical actions of a Latin American Municipal Network have promoted a culture of peace and the reduction of school violence; Relate experiences of Education for the 21st Century in promoting the culture of peace, in the context of Basic Education, the Gameleira Municipal Network, Elementary Education, Final and Initial Years, with pedagogical results and actions that seek the quality of the teaching process and learning.

Keywords: Culture of Peace, School Education, Ways to Peace, School Guitar Education, 21st Century Education

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Introduction

Delors (2012) and Debarbieux (2006) clarify that education must be attentive to contemporary social changes and adapt to such changes that generate transformations in society. From this perspective, the school needs to act on different fronts of action in search of promoting education with equity and quality, with democratic work being fundamental, open to collective participation and social well-being.

In the view of Tognetta and Vinha (2012), these transformations are driven by the cultures of young people as they expect from school, albeit unconsciously, something more than curricular content. They call for a comprehensive, meaningful education, where human values and interactions are constantly strengthened. The school of the 21st century radically changes its stance, as teachers push knowledge towards the student and no longer in their direction, with their objectives being: protagonism, motivation, autonomy and critical positioning of the student, in the face of the reality that surrounds him.

We also aim to understand Youth and Adult Education in Latin America based on a qualitative sampling of the Gameleira Municipal Network and its integration with the National Common Curricular Base and its relationship with the student's comprehensive training in the educational and social context based on the profile of the educator linked to 21st century Education, aware of the challenges that still exist such as infrastructure, training processes and teaching resources.

The methodological proposal of this research is content analysis and case study, with a qualitative evaluation of actions promoted by the Gameleira Municipal Network, in Basic Education in the Initial and Final Years of Elementary School, with a focus on deepening public educational policies aimed at the promotion of a culture of peace at school, whose qualitative approach, action research, becomes the best way when we aim to analyze specificities of locations or social groups.

Justification

The culture of peace in society, based on the universal goals of coexistence, established and proclaimed by resolution 217 A (III) of the UN General Assembly of 1948 (UN, 1948), It also needs to be followed by educational institutions, in our focus schools, which need to balance strategies to combat violence and promote peace, along with actions that seek the quality of the teaching and learning process, in consensus with Law 13,663, of 14 of May 2018, which amends Article 12 of Law No. 9,394, of December 20, 1996, to include the promotion of awareness, prevention and combat measures against all types of violence and the promotion of a culture of peace among the responsibilities of educational establishments.

Along this path, the Municipal Education Network of the Municipality of Gameleira – PE, in the Initial and Final Years of Elementary Education, has developed a list of actions that aim to guide pacification in its activities, with the premise of strengthening the school, implementing resources technological technologies and innovative actions, which enhance the teaching and learning process in a qualitative context with National and International emphasis.

Thus, this study investigated the performance of municipal public management and its actions and support to promote Education for the 19th Century, with a focus on promoting

culture and promoting education with equitable quality for all. Investigate education in a Latin American context and how this has promoted a culture of peace in the school environment, valuing social, economic and cultural aspects to strengthen student belonging to school and how this impacts the school routine. Along this path, this work contributed to guiding the promotion of a culture of peace and, consequently, the fight against violence in educational environments.

In this vein, we will approach 21st Century Education, in the Latin American context, having as a qualitative research point the Gameleira Municipal Education Network, which has been developing successful government public policies regarding this educational modality. Actions such as innovative practices, such as the use of technology, actions to strengthen learning and the incorporation of educational technology can help make learning more dynamic and accessible, allowing students to develop digital skills and have access to hybrid educational resources.

Regarding pedagogical actions, we have in the Gameleira Municipal Network, State of Pernambuco, in Brazil, a Popular Education that adopts a student-centered pedagogical approach, in which students are active participants in the learning process. This contrasts with traditional authoritarian, decontextualized and passive methodological approaches, which do not motivate critical thinking, citizen participation and autonomy of students.

History of Gameleira Education

 Gameleira, a municipality located in the state of Pernambuco, is known for its rich history and culture. Education played a fundamental role in the evolution of this community, shaping the present and future of its generations. This article will examine the trajectory of education in Gameleira, highlighting the historical milestones, the challenges faced and the impact on the lives of local inhabitants.

The history of education in Gameleira dates back to the beginning of the 20th century, when the first local educators came together to offer learning opportunities. The first schools were modest, often located in community buildings, but they reflected the community's commitment to education. Dedicated teachers worked tirelessly to provide children with access to knowledge.

In the following decades, Gameleira saw growth in educational infrastructure, with the construction of new schools and the expansion of the education system. However, progress has not been without challenges. The lack of financial resources, the lack of teaching materials and limited infrastructure were frequent obstacles. Still, the determination of educators and the local community continued to drive education forward.

Education was not just a means of acquiring knowledge in Gameleira; it was a transformative force. Schools have become centers of cultural and social activities, promoting community cohesion and the preservation of local traditions. Young people were trained to face personal challenges and contribute to the city's growth.

Over time, Gameleira overcame many of the challenges faced in the educational field. Government investments and local initiatives led to improved school conditions, teacher training and expanded access to education. Literacy rates have increased and the quality of education has improved significantly.

Currently, Gameleira has a network of public schools that offer quality education. Teachers, many of whom are children of the city, continue to play a crucial role in training future generations. The city proudly celebrates its achievements and its commitment to educational excellence.

The future of education in Gameleira is promising. Expansion plans, modernization of school infrastructure and the introduction of educational technologies are on the horizon. The city is determined to equip its young people to face the challenges of the 21st century and to continue contributing to the development of society.

Main Goal

- Understand Latin American Education in a historical and cultural context based on public educational policies linked to 21st Century Education in promoting the Culture of Peace, using the municipality of Gameleira – Pernambuco, Brazil as a point of investigation.

Specific Objectives

- Relate Educational Public Policies through 21st Century Education and the role of schools in promoting a culture of peace using the Gameleira Municipal Network as a qualitative analysis, within the scope of Elementary Education in the Final Years and Initial Years.

- Verify the extent to which the pedagogical actions of a Latin American Municipal Network have promoted a culture of peace and reduced school violence.

- Relate experiences of Education for the 21st Century in promoting the culture of peace, in the context of Basic Education, the Gameleira Municipal Network, Elementary Education, Final and Initial Years, with pedagogical results and actions that seek the quality of the teaching process and learning.

Methodology

The methodological procedure used in this research was a bibliographic review and literary refinement, which was based on concepts from the works of Silvia (2010), Heidrich (2009), Delors (2012), among others that address 21st Century Education in the context of Culture of Peace through innovative government public policies.

This work is a qualitative study, using bibliographic research, document analysis and constant data mining in articles and books. We also aim to understand 21st Century Education in the context of the Culture of Peace in Latin America based on a qualitative sampling of the Gameleira Municipal Network - PE and its integration with the National Common Curricular Base and its relationship with the student's comprehensive training in the context educational and social based on the profile of the educator linked to 21st century Education, aware of the challenges that still exist such as infrastructure, training processes and teaching resources.

As an object of qualitative study we have the Gameleira Municipal Education Network serving students from the Municipal Public Network in Basic Education, in the Initial and Final Years of Elementary School, through documentary research, interviews with participants and analysis of government public policies.

1. Initial Diagnosis:
Before starting the project, it is essential to carry out a diagnosis of the current situation in schools in the municipality. This may include collecting data on school violence, student, parent, and teacher perceptions of school safety, and identifying problem areas.

2. School Community Engagement:
Involving all members of the school community, including principals, teachers, students, parents and staff, is essential. Hold meetings to present the project and obtain the support and involvement of all interested parties.

3. Formation of the Coordination Team:
Appoint a coordination team that will be responsible for leading and implementing the culture of peace project. This team must include representatives from all interested parties, and must be responsible for planning, monitoring and evaluating activities.

4. Definition of Objectives and Goals:
Establish clear, measurable goals for the project, such as reducing rates of school violence, improving school climate, and increasing community participation in promoting peace.

5. Development of the Action Plan:
Create an action plan that describes the specific activities to be carried out to achieve the project objectives. This may include workshops, lectures, awareness campaigns, conflict mediation classes and peace-related extracurricular activities.

6. Implementation of Activities:
Put the action plan into practice, ensuring that all activities are carried out as planned. Monitor progress regularly and make adjustments as needed.

7. Awareness Campaigns:
Conduct school-wide awareness campaigns to promote a culture of peace. This may include spreading messages of peace, events and activities that involve students and the community.

8. Conflict Mediation Programs:
Develop conflict mediation programs, training students and teachers to act as mediators in conflict situations.

9. Assessment and Monitoring:
Regularly evaluate project results against established goals. Collect feedback from the school community and adjust the action plan as necessary.

10. Celebration and Recognition:
Recognize and celebrate the project's achievements, whether through awards, special events or ceremonies that value efforts towards a culture of peace in schools.

11. Expansion and Sustainability:
After obtaining positive results, consider expanding the project to other schools in the municipality and work on long-term sustainability, ensuring that the culture of peace continues to be promoted in schools.

12. Partnerships and Resources:
Seek partnerships with local organizations, government agencies and civil society groups to support the project and secure financial, human and material resources.

13. Final Assessment and Reports:
After project implementation, prepare a final report that highlights results, lessons learned, and recommendations for future culture of peace initiatives.

This methodology provides a general framework for implementing a culture of peace project in schools in a municipality. Adapting to the specific needs of the community and schools is essential to the success of the project.

Main Research Aspects

Scientific research is implemented in different aspects of investigation:
- **Literary refinement:** deepening the theme in different authors with the aim of understanding different arguments about the investigation.
- **Teacher Training:** Supervise regular training and qualification for EJA teachers, addressing best pedagogical practices and teaching strategies.
- **Infrastructure and Resources:** Identify actions to improve school infrastructure, ensuring adequate facilities and access to modern educational resources.
- **Monitoring and Evaluation:** Strengthen the continuous monitoring and evaluation system to measure student progress and identify areas for improvement.
- **Partnerships and Resources:** enhance actions that promote partnerships with civil society organizations, higher education institutions, local companies and government agencies.

Expected Results

The main results expected from the actions analyzed include:
- Promotion of a Culture of Peace in Schools with a focus on pacification in Social Environments through innovative pedagogical practices in Basic Education Schools, Municipal Network.
- Significant reduction in functional illiteracy.
- Increase in the completion rate of Elementary Education in the Initial and Final Years.
- Improvement in students' reading, writing and mathematics skills.
- Development of a more educated and egalitarian community.
- Strengthening bonds.
- Creating partnerships and articulations between different institutions.
- Evolution of educational indicators in large-scale assessments.
- Valuing students and education professionals.

Conclusion

This study investigated 21st century education in Latin America, in the context of promoting a culture of peace in the school environment, in a qualitative approach with the objective of the Municipal Education Network of Gameleira – PE, through the promotion of public policies linked to Basic Education, Elementary Education in the Initial and Final Years.

Education in the 21st century, in the context of a culture of peace, needs to seek strategies to combat violence and promote peace, together with contemporary actions that focus on the quality of the teaching and learning process, in consensus with Law 13,663, of 14 December May 2018, which amends Article 12 of Law No. 9,394, of December 20, 1996, which includes the promotion of awareness, prevention and combat measures against all types of violence and the promotion of the Culture of Peace as one of the responsibilities of educational establishments.

The story of education in Gameleira, Pernambuco, Brazil is a narrative of perseverance, commitment and progress. Over the decades, education has been a driving force in the community, empowering its inhabitants to seek a better life and contribute to the city's growth. Gameleira's educational legacy is a testament to the transformative power of education and its vital role in building a brighter future.

The results of the investigative processes revealed the evolution of educational indicators based on the promotion of a culture of peace in schools. These results were based on dynamic, democratic and cooperative teaching moments, with the participation of students who reflected, discussed and understood the importance of promoting a culture of peace in the school environment.

Finally, this work could contribute to guiding the promotion of a culture of peace and, consequently, in confronting school violence in Public Networks in Latin America and the World, through the promotion of public educational policies that have a social impact. Aware that there is no ready, complete, ideal formula for this problem, but paths that are clues for actions that we can follow in a pacification process proposed to consolidate education in the 21st century.

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Developmental Stages of L2 Syntactic Acquisition:
An Empirical Study in Thai EFL Context

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Abstract

This research aimed to identify the predominant developmental stages in which the majority of Thai EFL university students were currently operating. The empirical study of L2 syntactic acquisition was conducted within the framework of English question formation developmental stages, designed to address challenges in EFL learning. In this qualitative investigation, a purposive selection process was employed, enlisting a group of 120 intermediate to high proficiency university students as research participants. The evaluation of students' proficiency levels utilized the Standardized 300D Test of Nelson English Tests, while a picture-cued written task served as the research instrument to assess their competence in wh-question formation. The analysis encompassed 120 writing samples produced by non-English major students at Kasetsart University, Kamphaeng Saen Campus, employing Interlanguage Analysis. The outcomes, guided by the research hypothesis, revealed a discrepancy, indicating falsification, as 51 participants were currently operating at developmental stage 2: Aux^{2nd}, Do^{2nd} (42.50%), with statistical significance at the 0.01 level. Moreover, it was noticed that prerequisite knowledge from earlier developmental stages might not have been fully acquired in advance. From a pedagogical standpoint, the study recommended the implementation of a classroom model specifically tailored to address EFL learning challenges, particularly in the realm of syntactic acquisition.

Keywords: Developmental Stages, Syntactic Acquisition, Second Language Acquisition (SLA), English Writing, English as a Foreign Language (EFL)

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Background of Study

In the contemporary interconnected and globalized era, English plays a pivotal role as a global lingua franca. Its significance transcends mere communication, encompassing diverse domains such as business, education, and international relations. Proficiency in English writing skills holds particular importance, serving as a crucial tool for expressing ideas, conducting business transactions, and participating in academic endeavors. The ascendancy of English as a dominant language on the global stage has heightened the demand for effective English language learning strategies, especially in nations where English is taught as a Foreign Language (EFL) (Smith, 2023). Thailand exemplifies such a context, where the importance of English, especially in the domain of writing, is underscored by its relevance in both business and educational contexts.

In the Thai context, English assumes the designation of an EFL, and proficiency in the language is deemed essential for individuals aspiring to achieve success in both local and international arenas. The economic and academic advantages associated with a proficient command of English, particularly in writing, have led to an increased emphasis on English language education in Thailand (Nguyen, 2023). This emphasis is evident in various educational policies and programs aimed at enhancing English language skills. In addition, the business sector places a premium on effective English communication, with proficient writing skills being recognized as a key asset. However, despite concerted efforts, traditional methods of English language teaching in Thailand, particularly those centered on grammar instruction, have exhibited limitations in fostering practical language skills.

Historically, English education in Thailand has been characterized by a predominant emphasis on grammar rules and rote memorization, reflecting a conventional and rigid approach. While grammar undeniably plays a crucial role, an excessive focus on this aspect may hinder the development of practical language skills, especially in writing. Research suggests that an overly narrow focus on grammar might impede learners from acquiring a natural and intuitive grasp of sentence structure, consequently limiting their ability to communicate effectively (Smith, 2018). The imperative for a paradigm shift in English language teaching in Thailand becomes apparent, necessitating innovative and effective strategies that transcend the traditional confines of grammar-focused instruction.

The shortcomings of traditional English language teaching methods underscore the need for a more nuanced approach, particularly in the realm of writing. The exploration of the Developmental Stages of English Language sentence formation presents an intriguing avenue. Understanding how learners progress through distinct stages in acquiring syntactic structures can offer valuable insights into effective pedagogical strategies (Brown, 2019). Research in this domain has the potential to reshape the landscape of EFL education in Thailand, providing a fresh perspective on the development of English writing skills. By directing attention to the developmental stages of sentence formation, educators can tailor their approaches to align with learners' evolving linguistic abilities, fostering a more organic and comprehensive understanding of English syntax.

The applicability of the Developmental Stages of English Language sentence formation becomes even more pertinent in environments where opportunities for authentic language use are constrained. In numerous EFL contexts, including Thailand, learners may encounter challenges in immersing themselves in English-speaking environments, limiting their exposure to real-world language use. However, the developmental approach offers a

structured framework capable of guiding learners through various stages of syntactic acquisition, thereby providing a roadmap for language development even in linguistically constrained environments (Brown, 2019). This adaptive approach aligns with the needs of EFL learners who may lack the daily exposure to English outside the classroom.

In conclusion, the global significance of English, coupled with its specific relevance in the Thai EFL context, underscores the necessity for a departure from traditional teaching methodologies, particularly in the domain of writing. The Developmental Stages of English Language sentence formation emerges as a promising avenue for exploration, offering a fresh perspective on syntactic acquisition. By assimilating and understanding these developmental stages into pedagogical practices, educators in Thailand can augment the effectiveness of English language instruction, equipping learners with the essential tools needed to navigate the globalized world through proficient writing skills.

Developmental Stages in English Question Formation

The systematic process of language acquisition, whether within the realms of primary or secondary language acquisition, unfolded through developmental stages that progressed in a sequence beyond conscious control (Larsen-Freeman & Long, 1991; Heinsch, 1994; Willis & Willis, 2001). These stages, characterized as "developmental stages" by Johnston (1985), were integral to the comprehension of learnability, necessitating learners to encounter foundational knowledge in preceding stages for the acquisition of a new language. Pienemann's Processability Theory (PT) posited that learners navigated through distinct stages, emphasizing the impossibility of skipping stages (Pienemann, 2007). These stages played a pivotal role in understanding syntactic structures, particularly in the context of forming questions in English.

Dyson's (2008) elucidation of Pienemann's (2007) Developmental Stages of English Word Order delineated six sequential stages in syntactic acquisition, providing a structured framework for comprehending the stepwise progression of syntactic acquisition in English. The stages were outlined as follows:

Stage 1 involves learners lacking syntactic categories such as nouns or verbs, leading to communication limitations relying on non-verbal cues.

Stage 2 entails the production of flat strings as learners map words from their conceptual structure, resulting in the formation of basic SVO structures.

Stage 3 allows learners to acquire operations involving sentence beginnings and ends, facilitating positional exchanges, such as moving auxiliaries to the beginning.

Stage 4 introduces sentence-internal operations like subject-auxiliary inversion, constrained by working memory limitations.

Stage 5 sees the emergence of linguistic processing proficiency, enabling the movement of second auxiliaries after wh-words or wh-phrases.

Stage 6 focuses on operations within subordinate clauses, presenting challenges due to the cancellation of a prior developmental stage, where learners at this stage can cancel the inversion of subject-auxiliary in statements, marking a complex phase in syntactic development.

Previous research on developmental stages in English question formation highlighted their significance in language learning. Studies by Foster, Harris, and Joo (2010), Yumiko (2010), Mackey (1999), and Johnston (1985) emphasized positive sequences of acquisition, affirming that learners did not bypass stages. Doman (2012) examined Japanese ESL learners and

reported positive sequences in the highest stage of wh-question formation development. However, critiques by Hudson (1993) and Bachman (1990) contended that developmental stages offered a limited perspective, primarily focusing on syntax and morphology.

Foster, Harris, and Joo (2010) scrutinized English question formation in ESL university students, revealing diverse developmental patterns. Similarly, Yumiko (2010) conducted a longitudinal study on a Japanese learner, indicating independent development of developmental sequences in English questions. Mackey (1999) and Johnston (1985) identified positive sequences in grammatical development, reinforcing the necessity of prerequisite knowledge before advancing to the subsequent stage. Doman (2012) reiterated positive sequences in the highest stage, suggesting its utility in guiding language instructors.

Despite the positive viewpoints, critiques by Hudson (1993) and Purpura (2004) emphasized limitations. Hudson questioned the narrow focus on grammar in developmental stages, while Purpura pointed out empirical issues, such as limited fixed patterns and the absence of tests in classrooms. However, Doman (2007) argued against overlooking these drawbacks, emphasizing that developmental stages offered valuable insights into language acquisition, even if they provided only a partial view of language.

The study, specifically exploring English wh-question formation, omitted certain stages to align with its objectives. Stages 1 and 2, involving words and rising-intonation SVO structures, were excluded as participants were instructed to formulate wh-questions with given wh-words. Stages 3 and 4, encompassing do-fronting and yes-no inversion, copula inversion, were also excluded, as the study focused on subject and object wh-questions. Consequently, the framework for the study was presented in Table 1 below.

Table 1: The Modified Developmental Stages in L2 English *Wh*-Question Formation

Stage	*Wh*-Question types	Examples	Description
1	*Wh*-fronting	*What you write?*	Learners formulate inquiries by positioning a constituent antecedent to the subject, verb, and complement, thereby constructing wh-questions that initiate with an initial wh-word.
2	Aux 2nd	*Who will you see?*	Learners place the auxiliary, be it "do" or an alternative variant, in the second position during the construction of direct queries, and they extrapolate this pattern to indirect interrogatives through the process of overgeneralization.
2	Do 2nd	*What does she do?*	
3	Cancel Inversion	*I wonder who he is.*	Learners comprehend the syntactic structure employed in the construction of indirect inquiries.

Source: Adapted from Dyson (2008)

In summary, despite criticisms previously directed towards developmental stages within the realm of English interrogative structure, empirical research confirmed their pivotal role in guiding language acquisition. The manifestation of positive sequences of acquisition, as elucidated in diverse scholarly investigations, underscored the integral contribution of these stages to the developmental trajectory of learners, thereby providing invaluable insights for language educators. Despite the critical discourse surrounding them, developmental stages persisted as an invaluable instrument in illuminating the intricate processes underlying language acquisition.

Research Methodology

The study aimed to identify the predominant developmental stages among Thai EFL university students. This qualitative research involved 120 non-English major learners at Kasetsart University, Kamphaeng Saen Campus, with an average age of 19.38, ranging from 18 to 22. Only intermediate-high English proficiency participants were chosen to ensure a more comprehensive analysis of syntactic errors related to English wh-question formation. This selection criterion was based on the understanding that lower proficiency learners might lack the necessary skills for this particular aspect of English (Condelli and Wrigley, 2003; Graham and Macaro, 2007).

After carefully selecting participants based on their proficiency levels, all 120 intermediate - high English proficiency learners, who had studied English as a foreign language for over 12

years, were included. Additionally, these learners had formal instruction in English wh-question formation as part of their regular program, establishing a common academic background among the participants.

The sole research instrument employed in this study was a picture-cued written task, adapted from Lightbown and Spada's (1999) work. This task prompted learners to envision appropriate questions based on provided pictures. The test, comprising 30 images, was slightly modified by altering graphics and incorporating an underlined answer, along with a wh-word (who, what, or which) in parentheses as a cue for each expected question. The inclusion of answers aimed not only to aid participants in creating precise questions but also to prevent confusion and the use of unintended wh-words such as where, when, why, or how.

The task required participants to generate 30 wh-questions, including 10 subject and 10 object wh-questions, along with 5 embedded subject and 5 embedded object wh-clauses. These specific wh-clauses served to assess knowledge at developmental stage 3: Cancel Inversion. Each image was displayed for one minute, allowing participants to move to the next item, ensuring a timed response for each question. An item of a picture-cued written task was shown in Figure 1 below.

[1](Source: https://upload.wikimedia.org/ wikipedia/commons/8/82/GLAM_Wiki _Boot_Camp_DC_2013__David_Ferriero_ talking_to_attendees.JPG)

12. Question: I wonder_____. (who)
Answer: Nelson meets <u>Dr. Dean.</u>
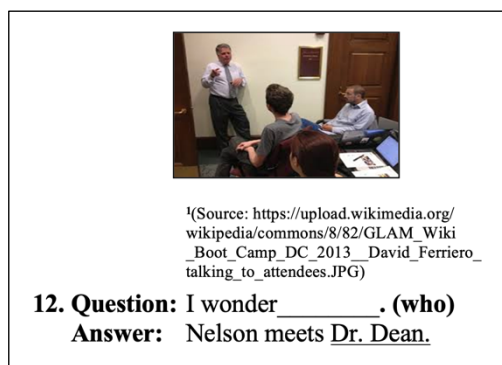
Figure 1: Example of the picture-cued written task

During the written task, participants were required to employ the provided wh-word (in this instance, "who"), ensuring its logical relevance to the image and the underlined word in the response. For the specific item in Figure 1, the anticipated answer was "I wonder who Nelson meets."

The purpose of the test was to identify the general developmental stages of Thai EFL learners in acquiring subject and object wh-questions. The sample was chosen using purposive sampling, considering specific criteria aligned with the study's objectives, as wh-question formation had been formally instructed in their classes with explicit syntactic rules. All students, regardless of their major, were required to enroll in compulsory English courses during the first semester as part of their academic obligations.

In this research, data collection procedures occurred in two primary phases: (1) assessing the overall English proficiency level of participants and (2) administering a writing task utilizing the Standardized 300 D Test of Nelson English Tests. This test, adapted from Zahra and Farahani (2012), has been endorsed by various researchers for its reliability in evaluating learners' proficiency level, as indicated by studies by Yasser (2012), Zahra and Farahani (2012), Kolaei et al. (2013), Behnaz et al. (2014), and Gholam-Reza et al. (2014). The test's suitability for this study stems from its convenience, established standardization, and

accuracy in measuring proficiency. Comprising fifty multiple-choice items, the test evaluates participants' lexical, grammatical, and phonological knowledge (Fowler and Coe, 1976). The test format has been modified into a table for enhanced readability and comprehension. It includes two sheets: Sheet I, a question paper with three parts assessing lexical and grammatical knowledge, and Sheet II, an answer sheet capturing participants' personal details and responses to the fifty items. Participants required approximately 40 minutes to complete the entire test.

Based on the pilot test, data were gathered from 30 EFL learners who had a comparable academic background to the study participants. The standard deviation (SD) was 4.804, and the mean was 20.1. Participants scoring between 0 and 15.673 (<SD - mean) were categorized as having lower English proficiency, those between 15.674 and 25.207 (SD ± mean) were considered intermediate, and those between 25.208 and 50.000 (>SD + mean) were classified as having high proficiency (Gholam-Reza et al., 2014; Zahra and Farahani, 2012). In summary, participants scoring between 15.674 and 50.000 were selected for the study. Before administering the Standardized 300 D Test of Nelson English Tests to assess overall English proficiency, all participants were required to sign a consent form for ethical considerations.

The utilization of a writing task for data collection provided the advantage of securing authentic data, as participants were assigned the task of formulating wh-questions within a controlled environment. To prevent potential influences from external sources, participants were situated individually in the English language laboratory, each having private partitions, and were allocated a restricted timeframe. However, drawbacks associated with this data collection method included the susceptibility to biases and varied interpretations. To mitigate these issues, two experts with proficiency in teaching English writing were enlisted to validate the collected data and address any potential biased judgments.

The researcher conducted data analysis in alignment with the study's objective: identifying the overall developmental stages of Thai EFL university learners in the acquisition of subject and object wh-question formation. Initially, each written work, comprising 30 items (10 subject wh-questions, 10 object wh-questions, 5 subject embedded wh-clauses, and 5 object embedded wh-clauses), was individually examined. Every item was categorized into specific developmental stages based on the Modified Developmental Stages in L2 English Wh-Question Formation. The quantities of items within each stage were aggregated, and percentages were computed to ascertain the prevalence of developmental stages. The participant's current stage was determined by the highest percentage among the three developmental stages (stages 1, 2, and 3). Subsequently, after analyzing all written works, the overall developmental stages of wh-question formation for all participants were identified. Finally, statistical analysis, specifically Proportion Testing (z-test), was applied to establish the significance level for hypothesis testing. Approximately 10% of the analyzed data underwent validation by two experts to address any disparities in response checking. Discussions with the experts were conducted, and any discrepancies were resolved to ensure accuracy.

Results

In scrutinizing the research hypothesis, a written task was employed to evaluate the developmental stage of each participant. The hypothesis postulated that the majority of Thai EFL university learners were operating at developmental stage 1: Wh-fronting. The

subsequent task focused on the syntactic structure of wh-questions, reflecting the participants' syntactic knowledge. The analysis entailed categorizing all 30 items in each written work to determine the corresponding developmental stage for each item. Following the completion of the categorization process, the items were tallied, and percentages were computed to discern the prevailing developmental stage for each participant.

The outcomes revealed a refutation of the hypothesis, with 51 participants (42.50%) presently functioning at developmental stage 2: Aux^{2nd}, Do^{2nd}. Moreover, 16 participants (13.33%) were currently at developmental stage 3: Cancel Inversion. However, data from 53 participants (44.17%) indicated that they were presently operating at developmental stage 1: Wh-fronting, corroborating the initial research hypothesis. In summary, the statistical analysis illustrated a higher percentage of participants not currently operating at developmental stage 1: Wh-fronting (55.83%), with a significance level of 0.01 ($Z = 1.10$, $Z_{0.01} = 2.367$). Consequently, the results contradicted the research hypothesis.

Contrary to the research hypothesis, which posited that the majority of Thai EFL university learners operate at developmental stage 1: Wh-fronting, this hypothesis has been contradicted. The data indicates that 51 participants (42.50%) crafted wh-questions by positioning an auxiliary ('do' or another type) at the second position of the sentence, aligning with the knowledge required for developmental stage 2: Aux^{2nd}, Do^{2nd}. However, there is supporting data in favor of the research hypothesis. This is evident in 53 participants (44.17%) who formulated English wh-questions by placing a wh-word at the initial position of the sentence (without an aux-insertion), and 16 participants (13.33%) who constructed indirect clauses by canceling inversion. Despite the supportive data from the 53 participants, the statistical analysis reveals a significance level of 0.01, which contradicts the research hypothesis.

Discussion

Developmental Stage 1: Wh-fronting
In the identification of the developmental stages involved in the formation of English wh-questions, participants were involved in a modified picture-cued written task. This task entailed the analysis of 30 wh-question items, encompassing subjects, objects, and embedded clauses. The findings unveiled that 53 participants (44.17%) demonstrated proficiency in constructing English wh-questions, particularly by fronting wh-words, indicative of mastery at developmental stage 1, surpassing stages 2 and 3. This observation aligned with the initially posited research hypothesis. Notably, among Thai speakers, the formation of object wh-questions without auxiliary insertion was commonplace, as the auxiliary was perceived as optional. Consequently, the majority of these participants formulated object wh-questions resembling subject wh-questions, potentially influenced by L1-transfer. Comparable patterns were observed in prior studies, illustrating a prevalent inclination among learners to predominantly operate at developmental stage 1, providing further insight into consistent findings within this language acquisition context.

Developmental Stage 2: Aux^{2nd}, Do^{2nd}
The outcomes demonstrated that 51 participants (42.50%) proficiently generated English wh-questions by incorporating an auxiliary in the second sentence position, indicating competence in the requisite knowledge at stage 2. Two plausible interpretations could be derived from these findings. Initially, participants successfully acquired aux-insertion during wh-question formation, having traversed developmental stage 1: Wh-fronting, as evidenced

by their elicited wh-questions. However, subsequent to aux-insertion learning, they encountered challenges in distinguishing between subject and object wh-question structures due to insufficient L2 syntactic knowledge. As a result, they generalized this aspect to both wh-question types, encompassing wh-clauses. In this context, their current operation was construed as developmental stage 2: Aux[2nd], Do[2nd], influenced by overgeneralization arising from limited familiarity with the target language (Brown, 1994). Furthermore, in contrast to the proposition by Pienemann (2007) and Doman (2012) asserting that L2 learners must sequentially process structures for acquisition, the study's findings challenged Pienemann's (2007) assertion that learners cannot skip developmental stages. The analysis of written works revealed that learners could correctly formulate wh-questions in later stages while making wh-syntactic errors in preceding stages, suggesting that not all learners necessarily required full mastery of prerequisite knowledge in earlier stages before progressing. Various studies aligned with the notion that the acquisition of English wh-question formation did not consistently adhere to a positive sequential pattern and varied among individuals (Foster et al., 2010 and Yumiko, 2010).

Developmental Stage 3: *Cancel Inversion*

Dyson's (2008) developmental stage necessitated extensive prerequisite knowledge, encompassing operations on subordinate clauses formed using wh-words and lacking auxiliary inversion due to the "cancelling" of knowledge acquired in stage 2. This presented a challenge for learners. Only 16 participants (13.33%) formulated embedded wh-clauses, with a restricted number displaying accurate ones, indicating canceled auxiliary inversion. The results imply that these participants had not fully comprehended the essential knowledge for wh-question formation, as evidenced by syntactic errors such as aux-omission, aux-insertion, aux-inversion, and inverted auxiliary in wh-clauses, reflecting inadequate familiarity with the target language. Previous studies have highlighted similar occurrences, attributing incomplete wh-question knowledge to influences such as insufficient L2 syntactic understanding, L1-transfer, overgeneralization, and learning difficulties in L2 contexts with differing L1 and L2 properties (Pienemann, 2007; Robert, 1998; Kumagami, 2006; Sheen, 2000; Jansen, 2005; Gao, 2009).

Conclusion - Pedagogical Implications

Discerning the developmental stages of L2 learners, particularly in intricate language structures such as wh-question formation, provided advantages. This investigation illuminated the diverse developmental stages experienced by Thai EFL learners, offering assistance to both learners and educators in monitoring advancement. Educators, through the classification of learners based on their respective stages, could concentrate on crucial elements in each, ensuring a methodical learning trajectory. This method empowered learners to comprehend the target language progressively. Furthermore, educators gained insights into prerequisite knowledge, providing guidance on when to strategically introduce specific stages in the learning process. This knowledge proved invaluable for enhancing the learning experience for both learners and instructors. A classroom model designed to address EFL learning challenges, particularly related to syntactic acquisition, was delineated in Figure 2.
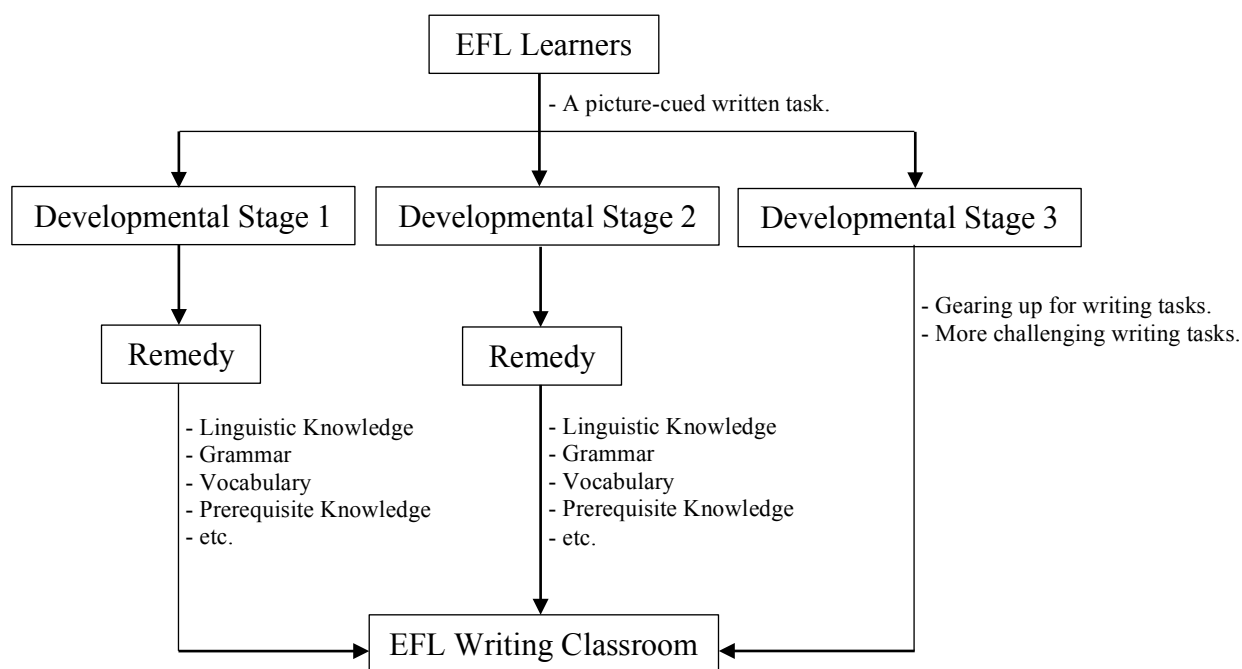
Figure 2: A Model of Teaching and Learning Process for EFL Writing

Note: All the images utilized in this study have received official permission from the copyright owners for repeated use and editing by the researcher.

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Exploring the Teachers' Perceptions Towards the Development of National Curriculum: A Phenomenological Study

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Abstract

The Indonesian national curriculum has undergone several changes in the last two decades. This phenomenon has various implications for teachers with different backgrounds. Through a phenomenological study, this research examines teachers' experiences in dealing with curriculum changes over the years. The informants in this study were eight teachers from various levels and types of schools and regions. Data were collected through in-depth interviews and analyzed by formulating textural and structural descriptions to define the construction of meaning. The results of this study indicate that: First, all informants faced the same phenomenon, but had different experiences due to differences in the level and type of their school; second, diverse experiences produce different meanings, where school conditions and needs, external support, and perspectives on challenges influence the teacher's adaptation process in dealing with the change.

Keywords: Curriculum Change, Teacher's Perception, Phenomenology

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Introduction

The curriculum is defined with a diverse scope, from interpreting the curriculum as lesson plans to official state documents (Gufron, 2017). In Indonesia, the curriculum definition refers to Law No. 20 of 2003 concerning the National Education System which states that a "Curriculum is a set of plans and arrangements regarding objectives, content, and learning materials as well as the methods used as guidelines for organizing learning activities to achieve certain educational goals." Hence, the curriculum has an important role in determining the direction and form of an educational process. Moreover, Westbrook et. al. (2013: 12), represent that "The curriculum is the key reference point for teachers, particularly in developing countries, where it is encoded in the official textbook and teacher guides, often the sole resource used by teachers."

The curriculum designed by the government based on the National Education Standards and applied nationally is known as the national curriculum. Until 2022, the national curriculum in Indonesia has gone through a series of developments. It was recorded that the development of the national curriculum occurred in 1947, 1952, 1964, 1968, 1975, 1984, 1994, 2004, 2006, 2013, and 2022 (BSKAP, 2022; Hasan, 2019; Ritonga, 2018). It can be concluded that in the last 2 decades (2002-2022), the national curriculum in Indonesia has changed 4 times. However, the implementation of curriculum changes does not always run smoothly in the field and often becomes something complex to do thoroughly (BSKAP, 2022; Fullan, 2007; Tribuzzi, 2017; Westbrook et. al., 2013).

Various studies have been conducted in other countries to examine how teachers respond to the transformation of the national curriculum. A study conducted by Clasquin-Johnson (2016) in South Africa concluded that teachers' reactions to curriculum changes varied, where the effective follow-up to adaptation to change was influenced by the extent to which teachers had a community of practitioners where they shared teaching practices. Another research was conducted by Mellegård & Pettersen (2016) in Norway which examined the differences in perspectives between policymakers and teachers in the field. Curriculum changes that provide an expansion of independence are interpreted by teachers as an expansion of demands, thus showing discrepancies between the perceptions of teachers and the government. Other research conducted by Jenkins (2020) in Australia concluded that the effectiveness of teachers in implementing curriculum changes proved to be highly dependent on school leadership, teacher relationships with leaders and co-workers, school operational practices, school culture, and personal motivation.

In Indonesia, there are also several studies regarding the existence of teachers amid curriculum changes and how they perceive them. A literature study was conducted by Mahmud (2013), with the title "Teachers in the Middle of Curriculum Changes" concluded that any curriculum changes would be meaningless if teachers did not make changes in their classrooms. Meanwhile Setiawati (2022), in her research "Impact of Curriculum Change Policy on Learning in Schools" concluded that the effectiveness of curriculum changes is determined by the teacher's attitude towards these changes, where changes will run optimally if teachers can see challenges as motivation. Then, research conducted by Lubis (2016), entitled "Readiness of Teachers as Curriculum Developers in Responding to Curriculum Changes" concluded that curriculum changes will run optimally if teachers can design and develop curricula at the level of class or school. These articles summarize valuable conclusions, yet they are not field research so it cannot reveal the authentic perceptions of the teachers. Among the few relevant field research, there are studies held by Hidayah et. al.

(2022), who tried to explore the perceptions of elementary school teachers towards curriculum changes through a descriptive survey in Yogyakarta, and Efferi (2017) who explored high school teacher's responses to curriculum changes through a case study at Madrasah Aliyah Negeri 1 Kudus (Public Madrasa). The two studies concluded that the teacher responses to curriculum changes were still not optimal due to various constraints and the teacher has not voluntarily been able to actively understand the changes. However, the topic of research requires further exploration to dig into teacher perceptions more broadly and in-depth, across different types of schools with intensive interviews. Therefore, this research was conducted to explore teachers' perceptions of the development of a national curriculum through a phenomenological approach to fill this research gap.

This study looks at the issue of curriculum change in Indonesia as a phenomenon and makes the teacher experience a research study. Referring to this, the research questions posed are: How is the teacher's experience related to the development of the national curriculum and how do teachers give meaning to their experiences towards the development of the national curriculum. It is hoped that this research can become the input for all stakeholders to narrow the gap between the perceptions of policymakers and policy implementers in the field. As stated by Soto (2015), curriculum development is an ongoing process that requires lots of analysis from curriculum developers.

Methods

This research is a qualitative study. According to Denzin & Lincoln (2018), qualitative research involves an interpretive and naturalistic approach to the world. Qualitative researchers study things in natural settings, where they seek to make sense of or interpret phenomena as meanings by people. Hence, this research was carried out naturally through direct communication between researchers and informants. The method developed in this research is phenomenology. According to Creswell & Potch (2018), phenomenological studies describe the general meaning for some individuals regarding their life experiences related to a concept or phenomenon. Phenomenology looks closely at a person's interpretation of his life experience and tries to understand the objective meanings behind it. Therefore, phenomenological researchers focus on uncovering the essence of human experience in order to truly understand it (Lodico et al., 2010).

The phenomenological analysis follows the step originated from Stevick, Colaizzi, and Keen, which was reformulated by Moustakas and then simplified by Creswell & Potch (2018). Contains 6 steps, which are: 1) Describe the phenomenon under study, 2) Identify the significant statements from the participant, 3) Define the meaning units, 4) Develop textural description, 5) Develop structural description, and 6) Formulate the essence of the experience.

This study was conducted from December 2022 to March 2023. The research informants consisted of 8 teachers from various levels, school types, and locations to provide rich perspectives. The selection of respondents used a purposive sampling technique with the criteria of having taught in the school at least for 10 years.

Informant	Length of Teaching (Year)	School Level	School Type	Location (City)
1	13	Kindergarten	Private	Semarang, East Java
2	19	Primary	Private, Madrasa	Wonosobo, East Java
3	19	Primary	Public, Special School	Yogyakarta, Yogyakarta Special Region
4	12	Middle	Private	Jakarta, Jakarta Capital Region
5	18	Middle	Public	Pesisir Selatan, West Sumatra
6	12	Middle	Public	Hulu Sungai Tengah, South Kalimantan
7	13	High	Public	Garut, West Java
8	18	High	Public, Vocational	Makassar, South Sulawesi

Table 1: Participant profile

Data collection was carried out through semi-structured in-depth interviews using a variety of different modes for each informant, including face-to-face, online virtual meetings, telephone, and text messages. The data credibility test was conducted through a process of increasing persistence and triangulation and the dependability test was conducted through the process of auditing all stages and results of research by colleagues (experts).

Result

The results of this study are divided into two parts which were developed from the research focus; *first*, is the textural description related to how the teacher's experience relates to the development of national curriculum; *second*, is a structural description related to how teachers give meaning to their experiences towards the development of national curriculum.

Textural Description: Teachers' Factual Experience on the Development of the National Curriculum

Informants in this study have become teachers in the past 12 to 19 years (by 2022). Therefore, their experience is at least related to the development of national curriculum in 2004. In that year there was a significant development by the national curriculum in terms of shifting curriculum content from previously content-based to competency-based. Therefore, the 2004 Curriculum is referred to as the Competency-Based Curriculum (Kurikulum Berbasis Kompetensi/KBK). Furthermore, in 2006, significant developments in the curriculum occurred in terms of increasing the authority of schools in developing a curriculum that is in accordance with the characteristics of the region, so that the 2006 Curriculum is referred to as the Education Unit Level Curriculum (Kurikulum Tingkat Satuan Pendidikan/KTSP). 7 years later, the 2013 Curriculum emerged which encouraged innovation in learning design by reformulating Competency Standards that were more comprehensive targeting aspects of knowledge, attitudes, and skills. Significant developments then occurred during the pandemic of Covid-19 (2019-2022) when the government provided three curriculum options that could be chosen by the school: The 2013 Curriculum, the Simplified 2013 Curriculum (Emergency Curriculum), and the Prototype Curriculum which was later renamed become the Kurikulum Merdeka.

During the national curriculum development, the background of the informants who came from various levels and types of schools made their experience under various conditions. The conclusions from the interviews conducted with all informants indicate that there are specific conditions in dealing with changes between teachers in Early Childhood Education and elementary-secondary schools, teachers in public and private schools, and teachers in public schools, madrasa, and special schools. The specificity of these conditions is related to how far the national curriculum has an impact on the process of teaching and learning in school (school flexibility to adjust curriculum) and how dynamic the school is in dealing with change. Hence, the participant faced the same phenomena but sometimes had a different assumption according to different teaching contexts. Therefore, there are different meanings which we can see in the structural description.

Structural Description: Teachers' Construct of Meaning Toward the Development of the National Curriculum

The results of interviews with all informants led to 6 units of meaning which could be categorized by the informants' meaning of their experiences. The units of meaning are acceptance, significance, adaptation, challenge, support, and expectation.

Acceptance

The acceptance aspect is related to the teacher's initial response to the issue of curriculum development. In this aspect, the teacher interprets the presence of the new curriculum in various ways (positively, negatively, or both). Positive responses see change as natural, while negative responses see it as something that is too soon to be done. However, overall the portion of positive (optimistic) statements far outweighs the negative (pessimistic) statements. Here are some expressions on this subject:

Positive phrases	Negative phrases
The curriculum must change, indeed, in the sense of development. (Informant 4)	*This is my experience and I have seen it from a number of friends, especially those who are seniors, because the changes are really fast, then there aren't many changes. So I thought, ah let the curriculum change as well, later the leaders will change the policies again. (Informant 7)*
It seems that is true if a minister replacement leads to curriculum replacement, but each minister must have an argument about why the curriculum was changed. (Informant 6)	
I see there is an effort for, what is it, to make the national curriculum more adaptive to what is called the needs of the 21st century (Informant 1)	*It's just that not everyone wants to accept the change easily. Depending on the individual teacher, not all of them easily accept the changes, especially the senior teachers. Minister change, curriculum change, is really a hassle. (Informant 2)*

Table 2: Informant statement about "Acceptance"

What is noted in the reception response to the issue of curriculum development is the appearance of the statement "Ministers change, curriculum change" whose intensity appears quite often from all informants, both when conveying positive (optimistic) and negative (pessimistic) things. It indicates that this statement is very popular among teachers and has

become the "Top of Mind" when discussing curriculum change policies. However, when explored further, all informants realized that these statements were actually not always accurate considering that the curriculum was not always changed when there was a change of ministers. This statement tends to be used as a justification for teachers who are not always ready to face changes when a change in curriculum occurs.

Significance

The aspect of significance is related to the extent to which the national curriculum has an impact on the implementation of learning in every classroom. Some informants indicated that the national curriculum greatly determines the teaching-learning process in the classroom, while others did not see it that way. Here is an overview of the mapping:

High significance	Low significance
It's quite an impact, sir, like when we teach, we want to explore anything, we have to refer to the curriculum, right? (Informant 2)	*It doesn't have much effect in my school - the replacement of curriculum from 2006 to 2013 or to a new curriculum. That is because we usually make some readjustments. (Informant 1)*
The national curriculum is important as a reference for schools to conduct appropriate learning in the school. (Informant 6)	*When 2013 curriculum appeared, I was not exposed to this curriculum. (Informant 4)*

Table 3: Informant statement about "Significance"

Informant	Length of Teaching (Year)	School Type	Level of significance based on the conclusion of the interview.
1	13	Private	Low
2	19	Private, Madrasa	High
3	19	Public, Special School	Low
4	12	Private	Low
5	18	Public	High
6	12	Public	High
7	13	Public	High
8	18	Public, Vocational	High

Table 4: The significance level of the national curriculum to the informants

This study found a pattern between the background of the informants and the significance level of the national curriculum for their schools. The first category is informants at the kindergarten level, private schools, and special schools who tend to show a low level of significance for the national curriculum because they are used to developing the national curriculum independently according to the characteristics of their schools. While the second category is informants at the primary-secondary, state schools, and madrasa levels tend to show a high level of significance because so far they are used to fully following curriculum directions practically. As a result, informants in the second category felt more serious impacts from changing the curriculum than informants in the first category.

Challenge

The aspect of the challenge is related to the teacher's main obstacle in facing national curriculum development. This study found two obstacles from the informant's experience, that is the mindset and administrative problems.

Mindset	Administrative
Soon the curriculum will change again so there's no need to change it first. This view still exists because maybe there are too many replacements in the curriculum. So we don't think we need to rush into following the changes because we're afraid that soon they'll be replaced again. (Informant 7)	*My time in the class was drained a lot to complete such administration. Especially with, for example, various administrations, it has to be this version, right? Anyway, now it has to be like this. So in Sundanese, we say ngagugulung administrasi (too busy with administration), so the children are neglected. (Informant 7)*
There are teachers who see administrative changes as a challenge, there are also teachers who see it as a threat. (Informant 5)	*The only difficulty was that earlier, which was about administration, about books, and about report cards. Usually, it's like that, yesterday still used the report card but now digital, right? So you have to make changes again. How do you want this? Not to mention there are several subjects that are merged or omitted. (Informant 2)*

Table 5: Informant statement about "Challenge"

When conveying a statement regarding the obstacles to facing change, the informant's focus shifted from himself to fellow teachers in general (other people and including himself). Shows that is a general observation that they get in the field. All informants understood the mindset and administrative constraints as a real problem. Mindset and administration issues are two different challenges but mindsets influence teachers' perceptions of administration. In this case, some informants viewed the change in administration as a logical implication of curriculum changes, while other informants only viewed it as a complication.

Support

The support aspect is related to what things can help teachers deal with the national curriculum development. This study found there are three parties that the informants hope to provide support in dealing with change: Colleagues (including the community or teacher professional organizations), school principals, and the government (referring to the ministry of education and regional education offices).

Colleagues	School principals	Government (Ministry & Regional education offices)
During this time I gained a lot of knowledge and learned many new things from the community. ... Those teachers who take the initiative to develop themselves will definitely receive training in certain activities. But if the teachers are passive and just stay at school, they won't get anything. (5) *Yes, it's quite good. Because I have several friends to discuss it with, so I can understand quite a bit. (Informant 2)*	*Within the school scope, the curriculum changes more quickly if the principal is adaptive to change. But if it's just the teacher and not the principal, it will take longer, sir. (Informant 5)* *Structural influence is still very much attached, both from the education department and the school principal. The executive function plays an important role in encouraging changes that often take time to process. (Informant 3)*	*Yes, for me, government support is very helpful. Facilitating with training, technical guidance, and seminars and something like that. (Informant 6)* *So if the government wants to make a new curriculum, they have not only introduced the concept, but also ongoing support by accompanying the teacher through the process. (Informant 7)*

Table 6: Informant statement about "Support"

All informants agreed that the school principal has a crucial role in implementing changes in the field. The principal acts as a locomotive that can make teachers move. Meanwhile, the government plays a role in providing adequate training and assistance. In general, differences were found in informants who had community networks or teacher organizations. The more active the teacher is in the community, the more it will help them understand change. However, the more disconnected from the community, the more challenging the efforts to build a comprehensive understanding of change because they only rely on assistance from school principals and the government without carrying out independent initiatives.

Adaptation

The adaptation aspect is related to what extent teachers in the field can adapt curriculum developments. This aspect is directly related to the aspects of acceptance, significance, challenge, and support. Teachers who are used to developing curricula flexibly, who get support from colleagues and school leaders, and who have an open mindset tend to be more optimistic about adaptation. An example of optimism is illustrated by the following statement:

> *Any curriculum from the government, once it reaches the school, is directly adapted to the conditions and needs in the field. At school, we have implemented the principles of flexibility and student-centeredness in accordance with the current curriculum directives. (Informant 3)*

> *Conceptually understanding the curriculum does not take more than a month. (Informant 8)*

The informants' optimism about the adaptation process was built from their experience of dealing with curriculum changes in their schools. A dynamic school environment tends to form a more adaptive awareness of change because it positions the teacher as a curriculum developer, while a less dynamic school environment tends to form a pessimistic awareness of change because it only sees the teacher as a curriculum implementer.

Discussion

Construction of Meaning From Perceptions of Curriculum Development

Informants representing teachers from various backgrounds indicated that they basically agreed with developments. They understand that education is always developing and therefore the national curriculum must also be updated. Controversy arises according to the subjective ideal period. Some teachers believe that changing the curriculum in 10 years is too fast, while others see it as quite ideal. Another thing that forms the teacher's negative perception of curriculum development is a change from a technical-administrative perspective. Changing the curriculum is the same as changing all forms of teaching documents which is quite complicated, accordance to research by Mellegård & Pettersen (2016) who found discrepancies in perceptions between fellow teachers as policy implementers and teachers with the government as policymakers. Amid these conditions, curriculum changes are often closely related to increasing administrative demands.

In the school context, informants have two assumptions: That the national curriculum has a direct impact on the teaching process in schools (high significance) and that the national curriculum does not have a direct impact on the teaching process (low significance). This level of significance is influenced by the condition of the school environment. The higher school's ability to develop its curriculum independently, the lower significance of changes to the national curriculum for teachers. In this case, the mindset of informants is formed by the experience in adapting and socializing with the culture in their respective school environments. However, these findings strengthen the results of literature studies from Setiawati (2022), Lubis (2016), and Mahmud (2013) which indicate that teachers often face all administrative problems and that a positive mindset can help them deal with changes.

Related to the external factors, all informants stated that the school principal has a very crucial role in how teachers begin to respond the development of curriculum, the government has an important role in facilitating and accompanying the teacher's adaptation process to new policies, while colleagues and the community have an important role in providing reinforcement from sharing good practices. Therefore, school principals, government, and colleagues have complementary roles in supporting teachers in dealing with change. This fact is aligned with the relevant research that school principals and co-workers have a significant influence on assistance in adjusting to change (Jenkins, 2020); that adequate teacher training is an important thing that needs to be really considered in the framework of educational change (Fullan, 2007; Soto, 2015; Westbrook et al., 2013), and; that a community of practitioners can help teachers face challenges better (Clasquin-Johnson, 2016).

Acceptance, significance, challenge, and support aspects then influence the adaptation process in dealing with changes. Teachers who perceive themselves as curriculum implementers tend to be pessimistic about the adaptation process while teachers who perceive themselves as curriculum developers have an optimistic view. This is in line with the findings of Soto (2015) that in the midst of curriculum development, an important ability that teachers

must have is the awareness that they are curriculum developers at the classroom and school levels. In this case, the way teachers perceive their role is influenced by their mindset and school environment which are summarized in the aspect of acceptance, significance, challenge, and support that we have discussed.

Conclusion

This study yields two conclusions that refer to the answers of the research questions: *First*, the informants who came from various school and regional backgrounds experienced the same phenomenon of the national curriculum development which took place 2 times in the last 10 year period (2012-2022) and 4 times in the last 20 year period (2002-2022). In that period they faced the same issues but with varied experiences due to differences in background levels and types of schools; *Second*, different experiences in dealing with the phenomenon affect the various meanings for them. Informants perceive the influence of curriculum changes on daily teaching based on their school system, they expected comprehensive support from school principals, the government, and the peer or community, and they agreed that the mindset and administrative issues were the main obstacles but they interpreted it differently as a challenge or a pure problem. Therefore, informants who have a growth mindset and positive environment tend to be more optimistic and ready to adapt compared to other informants. It can be concluded that diverse experiences produce different meanings, where school conditions and needs, external support, and perspectives on challenges influence the teacher's adaptation process in dealing with the change. However, the findings in this study can enrich the field studies that have been conducted by Setiawati (2022) and Efferi (2017) in providing a richer picture of teachers' perceptions of Indonesian curriculum changes in multiple contexts.

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Project Management Education for Value Creation

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Abstract

Project management is a fundamental knowledge and skill in the field of engineering. Conventional project management has been based on a waterfall process to achieve deliverables while balancing the scope, schedule, and cost. Today, project management aims to not only obtain deliverables but achieve outcomes for value creation with sustainability. Furthermore, the project management process has become more diverse, including waterfall, agile, and a combination of them. The Project Management Body of Knowledge and the Standards have shifted from the methodologies defining detailed processes to the general principles. Project management education in universities should respond to value creation in diverse project models. However, the general principles are difficult to learn for students with limited practical project experience. Careful consideration should be given to designing project management educational programs. We researched the requirements for project management education for value creation in diverse processes and analyzed the gaps between recent demands and current project management education in universities. We propose a framework for project management education to achieve the learning outcomes for the program and allocate learning outcomes to projects, exercises, and lectures of project management education programs for value creation.

Keywords: Project Management, Education, Value Creation, Framework

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1. Introduction

1.1 Systems Engineering and Project Management

Engineering, particularly systems engineering, is closely related to project management (PM). Systems engineering and PM provide information that spans the entire engineering process. Systems engineering serves as the basis for comprehensive problem-solving. It is a systematic methodology for defining, analyzing, modeling, designing, and implementing solutions to real-world problems. In contrast, PM is a framework for problem-solving projects that includes planning, organizing, teamwork, communication, and management.

1.2 Project Management Education

Conventional PM uses the waterfall process to obtain desired deliverables while balancing scope, schedule, and cost. Currently, projects aim for deliverables and outcomes for value creation and solving social issues. In addition to the waterfall process with well-defined specifications at the beginning of the project, followed by design, implementation, testing, and operation, PM uses the agile process and a combination of both processes. The agile process repeats the development processes of planning, design, implementation, and testing in short cycles, considering changes in requirements as a precondition to achieving high-value results.

As a result, the PM body of knowledge and standards are shifting from process-defined methodologies to principle-centered contents, such as action guidelines.

PM education in many universities has been process-based, focusing on the waterfall process. Currently, there is a need for PM education that responds to value creation and rapid change. However, project experiences can provide insight into the essence of PM principles, such as action guidelines. Understanding such ideas is challenging for undergraduate and master's degree students who lack practical experience in project execution. In addition, it is difficult for students to take adequate actions if they only have knowledge of the principles.

Based on the demand for PM for value creation, herein we review and analyze the effectiveness and weaknesses of PM education integrated into engineering education. Furthermore, we emphasize engineering education and value-generating projects. Finally, we present the learning outcomes of PM education for value creation and discuss how educational programs should be designed in terms of projects, exercises, and lectures.

2 Project Management Education Initiatives Integrated Into Engineering Education

2.1 Systems Engineering and Project Management Education

This section presents the benefits and challenges of integrating PM education into engineering education. Systems engineering and PM are common frameworks that serve as the basis for the real-world activities of engineers. They share many similarities, as education in both knowledge and practical experience is required in both disciplines. Fig. 1 shows the relationship between systems engineering and PM. Both disciplines share an interdisciplinary approach to achieving quality, cost, and delivery (QCD), and they share concepts such as scope, time, cost, quality, and risk management.

However, each discipline comprises many unique areas. Systems engineering provides a technical framework for constructing system components, and its unique areas include design, modeling, and optimization. However, PM is a management framework for the successful implementation of projects, and its unique areas include human resources and communication management.

These two disciplines share some techniques and tools, such as brainstorming, work breakdown structure, the critical path method, earned value management, the analytic hierarchy process, and quality function deployment. The knowledge and skills of both disciplines are effective for engineers who promote systems development, and coordinated education is effective.
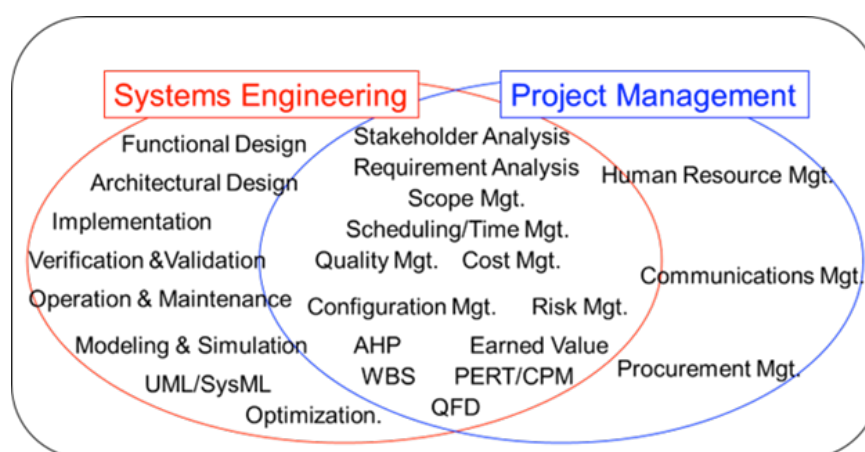
Figure 1: Relationship Between Systems Engineering and Project Management

2.2 Project Management Education Integrated Into Engineering Education

Educating students who have little practical experience in subjects that depend on empirical knowledge, such as systems engineering and PM, is a major challenge. It is essential to provide students with experience, both real and simulated, and careful coordination of the sequence of lectures, exercises, and projects is essential to their understanding. To address this issue, Inoue and Hasegawa (2010) (2013) have implemented an educational program in which projects, exercises, and lectures are programmed in an evolutionary manner, as shown in Fig. 2. In undergraduate and master's degree programs, project-based learning courses and lectures are scheduled alternately to foster awareness of problems through exercises, understand theories and techniques as a means of problem-solving, and repeat projects in problem-solving by applying such theories and techniques.

As shown in Fig. 2, Systems Engineering A (problem discovery and solving) is scheduled for the second semester of the second year. The content includes systems engineering and system life cycles, problem-solving processes, system requirements definition, system functional design, system evaluation methods, and special lectures from the industry. Simultaneously, System Engineering Exercise A, an exercise course, and a project are organized.

Systems Engineering B (quantitative decision-making methods) is offered in the first semester of the second year. The content includes decision-making methods, stochastic and statistical analysis methods, simulation, and scheduling methods, as well as special lectures from the industry. Simultaneously, the exercise of quantitative decision-making methods, Systems Engineering Exercise B, is arranged and the project is implemented.

PM courses are offered in the first semester of the third year. The course contents include management processes, project initiation, scope management, time management, cost management, exercises in PM tools, risk management, quality management, human resource management, communication management, special lectures on industry, and PM planning exercises. System Engineering Exercise C, which is an exercise course, also runs simultaneously with projects that address real issues in the industry and local communities.

In master's degree programs, a short-term abroad program for global project-based learning (Inoue, 2016) (Inoue, 2020) in collaboration with the industry and local communities is offered, during which students execute projects that solve sustainable development goals (SDG) and industrial issues in cross-cultural environments with students from oversea universities. In addition, as education for soft skills, such as leadership, students acquire leadership skills and gain diverse experiences through repeated simulated exercises using meeting simulators (Inoue & Maruyama, 2014), which they can apply to projects, capstone projects, and global project-based learning.
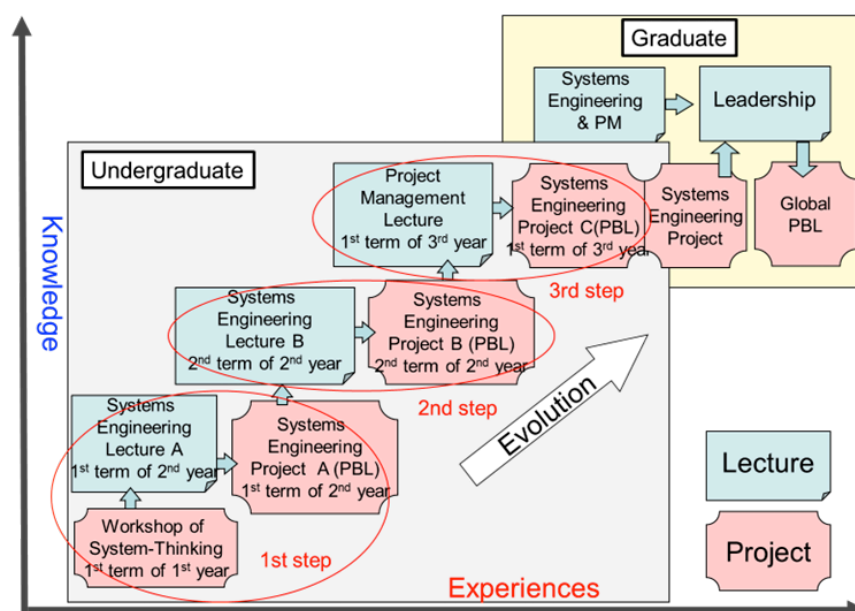
Figure 2: Project Management Education Integrated into Engineering Education

3   Engineering Education and Projects for Value Creation

3.1   Value Creation

It is necessary to clarify the project stakeholders and envision the value for each stakeholder. Value can be diverse, including economic value and social value and it changes over time. It also changes with social changes, technological changes, and changing needs. The value of a project may not be clear at its conception stage. It is unclear how stakeholders will find value; therefore, a prototype may be required to verify value.

3.2   Projects for Value Creation

Challenge-based learning (CBL) is project-based learning for value creation and is being introduced mainly in engineering universities (Rådberg, 2020). CBL is based on the identification, analysis, and design of a solution to a sociotechnical problem. The learning

experience is typically multidisciplinary, involves different stakeholder perspectives, and aims at finding a collaboratively developed solution that is environmentally, socially, and economically sustainable. It is necessary to define the knowledge and skills required to implement CBL. It is necessary to consider how such knowledge and skills can be taught in the lectures.

3.3 Project Canvas for Value Creation

A project framework for value creation has been proposed. Nieto-Rodriguez (2021) proposed a project economy, in which the Project Canvas is employed as a framework for value creation. As shown in Fig. 3, the framework comprises foundation, people, creation, investment, and benefit.
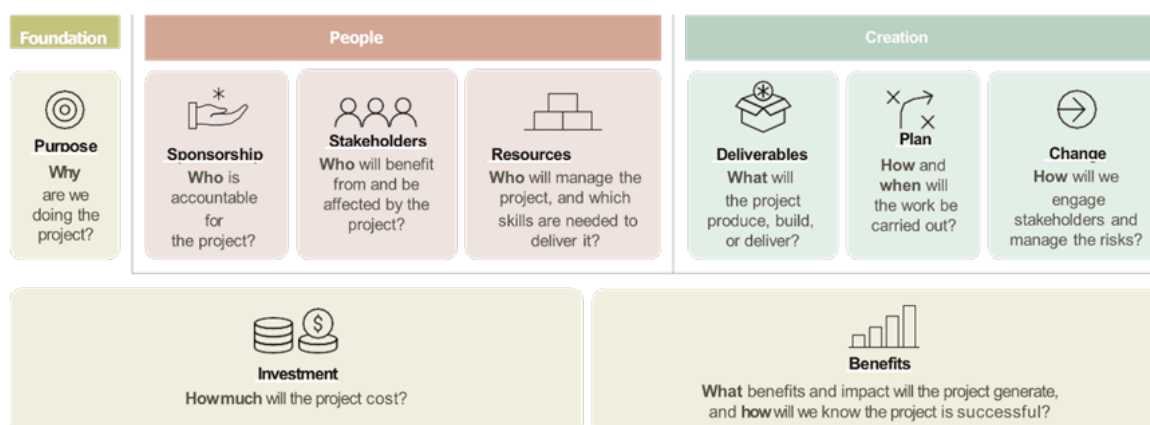
Figure 3: Project Canvas

3.4 Framework for Project Management Education

The Project Management Institute (PMI), a professional association for PM, has developed a framework for PM education (PMI, 2025) by academics for academics. It is designed with a module structure that considers various engineering disciplines. The curriculum framework defines knowledge modules (KMs) and sets learning and educational objectives for each KM, as shown in Fig. 4. Multiple KMs are collected to form courses, and educational programs are designed by sequencing multiple courses.
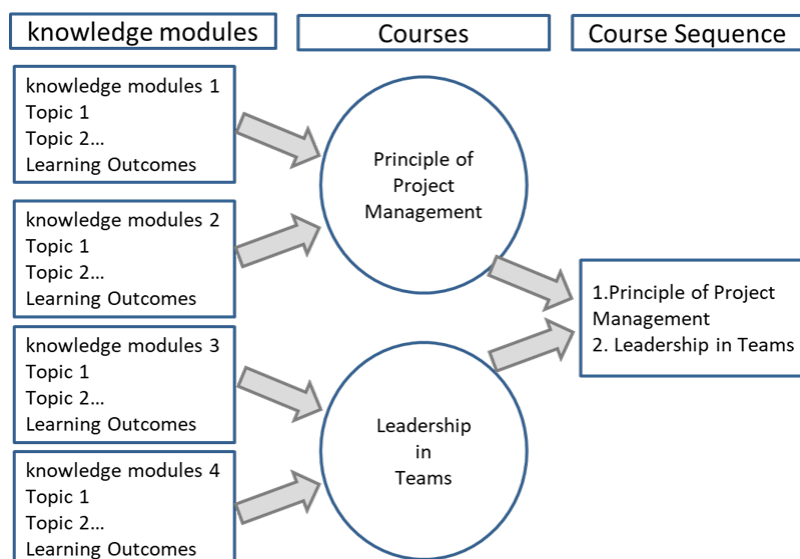
Figure 4: Mapping Knowledge Modules to Design a Sequence of PM Courses

Each KM has a distinct set of learning outcomes, and the PM curriculum should be flexible so that the KM framework can be easily adopted in many disciplines and industrial domains. The guidelines should offer flexibility in collating topics into courses to create relevant curricula in different academic situations and countries. KMs have three categories: (1) technical knowledge; (2) behavioral skills, capabilities, and competencies; and (3) strategic awareness.

(1) Technical KMs include the basic theory and practice of PM. They provide students with a comprehensive technical understanding of the common themes and principles of PM. Technical KMs explain how one can apply one's knowledge to meet project requirements.

(2) Behavioral KMs consider the personal, behavioral, and organizational aspects of PM and provide students the opportunity to develop both personally and professionally. They integrate the well-rounded PM knowledge of an individual with communication, management, and organizational competence.

(3) Strategic KMs consider the business, commercial, and organizational aspects of PM, including strategic issues, program and portfolio management, and governance. They also include emerging topics in PM, such as agile approaches to PM, international issues, and global projects.

3.5 Project Management Body of Knowledge and Standards

PMI (2021) published the Project Management Body of Knowledge (PMBOK) Guide. Until its sixth edition, the PMBOK Guide focused on PM processes, knowledge areas, and techniques, but several changes have been made since its seventh edition, with the PM processes and principles being replaced by knowledge and performance areas, respectively. Project principles are guidelines for behavior during project execution, and they represent the principles of responsibility, respect, fairness, and integrity. The project performance areas are activities that aid in the effective delivery of project outcomes.

Here, we examined the learning outcomes of eight performance areas based on our perspective, assuming PM education in universities, including stakeholder performance, team performance, development approaches and life cycle performance, the performance area of planning, project work performance, delivery performance, measurement performance, and uncertainty performance.

The learning outcomes of stakeholder performance include the ability to effectively identify, analyze, and engage stakeholders. The learning outcomes of team performance include the ability to develop critical thinking and human relations skills and tailor multiple leadership styles. Development approaches and life cycle performance include an understanding of waterfall and agile development approaches and the ability to select and execute a development approach that matches the project deliverables. For the performance area of planning, the learning outcomes include understanding schedule and cost-estimation methods and being able to develop a plan, and those of project work performance include being able to focus on what the project team should work on, balance competing constraints, and implement a continuous learning process. The learning outcomes of delivery performance include the ability to define scope based on requirements and understand quality and change costs. Measurement performance includes the ability to evaluate performance and establish effective measures, and uncertainty performance includes being able to manage risk.

4   Results and Conclusion

4.1   Target Projects for Value Creation

(1) The target project is more than just a project to create deliverables satisfying QCD against predetermined goals. It is a cross-disciplinary engineering project that analyzes the value of diverse stakeholders, discovers goals, and creates valuable outcomes.

(2) It is difficult to determine the detailed goals of a project at the beginning of the project. In addition, the goals of a project can change with time. The agile process, the waterfall process, or a hybrid of both can be employed in a project.

(3) Engineers must be able to make comprehensive judgments to realize a sustainable society, considering technological as well as political, economic, historical, and cultural backgrounds and constraints.

4.2   Scope of Project Management Education

(1) PM education should be integrated into engineering education, and the correlation between systems engineering and PM is particularly important.

(2) It is important to introduce education that provides knowledge and experience for value creation, problem-finding and problem-solving processes with diverse stakeholders, and cross-cultural and interdisciplinary mixed teams.

(3) Engineering education targets not a single technology but cross-disciplinary technologies. It also provides knowledge and skills for solving social issues, such as the SDGs.

4.3 Curriculum Framework and Pedagogy

(1) For PM and systems engineering, which require practical experience, an effective curriculum should repeat lectures, exercises, and projects in stages.

(2) The design method of structuring courses with a combination of KMs with clearly defined learning outcomes is highly versatile and can respond to changes in societal demands.

(3) PM principles are KMs, but it is difficult for students to correlate their superficial understanding of PM principles with their actions. Students must have the opportunity to apply such principles in practice and have a chance to reflect on them. It is vital to incorporate such principles as a perspective for evaluation and reflection in project-based learning courses. Case studies are also effective, as students can reflect on PM principles through simulated case studies.

(4) Only PM principles are not enough for planning and designing a project. Knowledge acquisition and exercises on problem-solving and tools, along with the PM process, are necessary.

(5) KMs change in response to changes in time and project concepts and emphasis. Educational programs can be made flexible by incorporating or substituting KMs in courses, and KMs can be shared across universities.

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The Effectiveness of Online Teaching Activities: A Case at UFLS – UD, Vietnam

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Abstract
Universities have been very interested in implementing online teaching activities, which is the optimal choice in a modern society. University of Foreign Language Studies (UFLS) belonging to the University of Danang (UD), Viet Nam have focused on implementing this activity in many recent years through a variety of work such as investing in information technology infrastructure and software, organizing training courses for teachers to use them, encouraging teachers in being conscious of implementing online teaching, spending time to invest in drafting lectures, applying teaching methods suitable to the online teaching model in order to integrate maximize the learning activities of learners. However, all these things have not really met the demand at all for bringing the effectiveness of online teaching due to a lot of reasons. There were still cases where teachers have not mastered online teaching equipment, especially supporting software as well as responding to students' questions about lessons in the teaching process. The paper used qualitative and quantitative as well surveying methods with 373 students of UFLS-UD to find out the current situations and proposed appropriate and feasible solutions to improve the activities of online teaching to ensure the quality of high education at UFLS–UD, Viet Nam in personal and universities in general.

Keywords: E-Teaching, Effectiveness, E-Learning, UFLS, High Education

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Introduction

Online teaching and learning activities have become popular for all educational levels in general and at the university level in particular, especially for universities in the context of the Covid 19 epidemic out worldwide. In particular, during the complicated Covid 19 epidemic in Vietnam, it was the interactive teaching activities that helped the training process of universities take place without interruption, thereby not affecting the training process training the country's human resources. However, like any other teaching activities, interactive teaching activities also have certain limitations such as: interactive teaching activities are deployed on the Internet platform, so they greatly affect the ability to interact between teachers and students, between students and students; The quality of the internet connection is a major issue that needs attention when implementing interactive teaching because the quality of interactive teaching activities is seriously affected by the quality of the internet connection, especially for classes with a large number of students or for students in remote areas; Teachers' online teaching methods and skills as well as online learning methods and skills are issues affecting the quality of interactive teaching. Therefore, to achieve quality in interactive teaching requires the attention and investment of universities, teachers and students. In recent times, universities in Vietnam have paid great attention to implementing interactive teaching activities, especially in the context of epidemics like Covid 19, interactive teaching is the optimal choice. For the University of Danang (UD) and its member universities, including the University of Foreign Languages Studies - University of Danang (UFLS-UD), they have focused on implementing interactive teaching, especially during the epidemic Covid 19 disease to ensure the implementation of the training program according to the school year plan while ensuring health safety issues against the epidemic for teachers and students.

Aims of the Study

Based on the theoretical basis of interactive teaching activities at universities and the results of evaluating the effectiveness of interactive teaching activities at UFLS - UD, this study aims to propose solutions to improve the effectiveness of interactive teaching activities at UFLS - UD, contributing part of improving the training quality of the School.

Main Concepts in Online Teaching Activities at University

At universities, teaching activities are the most typical and main activities of the school. Teaching activities are the organization and optimal control of the process of students acquiring knowledge, forming and developing their personality. Learning activities are the process by which students optimally control their mastery of scientific concepts, thereby forming a new psychological structure and developing a comprehensive personality. The two activities of teaching and learning have a close relationship with each other, exist in parallel and develop in the same unified and complementary process. The results of students' learning activities cannot be separated from the results of teachers' teaching activities and vice versa. With the approach to the teaching process, the author Nguyen Duc Chinh defined: "Teaching is an active process in which the teacher shares information with learners, in order to provide and help them process information to achieve the goal of changing their behavior" and "Learning is the process of assimilating information to change behavior in a comprehensive way" (Nguyen Duc Chinh, 2009). Teaching activities at universities are understood as a common and unified process of activities between teachers and students, in which teachers organize, control, guide, test and evaluate the learning process; Students are self-aware and

actively self-organize and self-control their cognitive activities to perform well on learning tasks.

Methodology

Access to Teaching Activities

Using the teaching activities approach to the research topic, we consider the interactive relationship between teachers' teaching activities and students' learning activities to achieve teaching goals. Specifically, based on the requirements of teaching activities in general and interactive teaching activities in particular, we survey the interaction of teachers and students through teachers' teaching activities and students' learning activities in the interactive teaching process. and achieving the goals of interactive teaching activities. On that basis, we propose solutions to improve the efficiency of interactive teaching activities.

Access to the System

Using a systematic approach to the research topic, we consider the factors affecting the effectiveness of interactive teaching activities as well as the relationship between factors affecting the effectiveness of interactive teaching activities. From there, we propose the solutions to improve the effectiveness of interactive teaching activities, in which the solutions to improve the effectiveness of interactive teaching activities are considered in the relationship between interactions and establish the priority of each solution to ensure the feasibility of the solution in the current period to propose recommendations for the School to have a basis for application.

Approach to Assessment and Measurement in Education

Using the assessment and measurement approach in education for the research topic, we establish the contents to evaluate the effectiveness of interactive teaching activities, on that basis, we survey the current status of the effectiveness of interactive teaching activities in the study area. In addition, using the assessment and measurement approach in education for the research topic, we test the urgency and feasibility of solutions to improve the effectiveness of interactive teaching activities and then propose recommendations for schools with priority basis for application.

Questionnaire Survey Method

Using the questionnaire survey method to collect information on a wide spectrum, with a large number of subjects, can allow researchers to draw highly reliable conclusions. Using this method, we surveyed the opinions of 373 full-time students (2nd to 4th year of the 2022-2023 school year) of the Faculty of English (FA), Faculty of English for Specific Purposes (FESP), and Faculty of International Studies (FIS) of UFLS - UD on the effectiveness of interactive teaching activities.

Product Research Methods Work

Conduct research on documents governing interactive teaching activities and interactive teaching plans at UFLS - UD to explain the current state of effectiveness of the school's interactive teaching activities.

Interview Method

Discuss with students information about the advantages and disadvantages of the interactive teaching process at UFLS - UD, especially in the context of the Covid 19 epidemic to have

more basis to explain the current state of effectiveness of the school's interactive teaching activities.

Observation Method

Observe interactive teaching activities at UFLS - UD to have an overview of the current status of interactive teaching activities and from there have more assessments on the current state of effectiveness of interactive teaching activities at UFLS - UD.

Research Methods

The following methods used in the study: descriptive method for describing the data collected, analytic and synthetic methods.

Findings

1. Current Status of Students' Awareness of the Necessity of Interactive Teaching Activities at UFLS – UD

In order to analyze and evaluate the current state of students' awareness of the necessity of interactive teaching activities at universities, we polled the opinions of 373 full-time students (2nd to 4th year of the 2022-2023 school year) of FA, FESP and FIS of UFLS - UD. The survey results show that most of the students surveyed at UFLS -UD highly appreciated the necessity of interactive teaching activities at the university, with survey results showing that up to 89% of surveyed students evaluated this. level of necessity or higher (42.4% of surveyed student opinions rated it as very necessary, 46.6% of surveyed student opinions rated it as necessary). This has important significance, contributing to the effective implementation of interactive teaching activities at UFLS - UD. However, the survey results show that there are still some students who are not really aware of the necessity of interactive teaching activities at universities, of which 9.9% of surveyed students think that these activities are Interactive teaching at university is relatively necessary. In addition, 0.8% of surveyed students thought that interactive teaching activities at university were not necessary and 0.3% of surveyed students thought that interactive teaching activities at university were completely unnecessary.

2. Current Status of Students' Assessment of the Advantages of Online Teaching Activities at UFLS – UD

To have an overall view of students' assessments of the advantages of interactive teaching activities at universities, we surveyed students' opinions on choosing the advantages of interactive teaching activities at universities with the following contents: Training for all students. anytime, anywhere; Save on study costs; Save study time; Teachers and students are proactive and flexible in teaching; Optimize teaching content; Use a variety of images, sounds and videos in the teaching process. Survey results of 373 full-time students (2nd to 4th year of the 2022-2023 school year) of FA, FESP and FIS of UFLS - UD. The scores of interactive teaching activities at universities show the advantages of interactive teaching activities at universities ranked by students in order from high to low as: Training anytime, anywhere (60.9% of opinions rated price); Teachers and students are proactive and flexible in teaching (59.8% of reviews); Use a variety of images, sounds and videos in the teaching process (49.6% of reviews); Save study time (39.1% of reviews); Save learning costs (37.9% of reviews); Optimize teaching content (24.9% of reviews).

3. Current Status of Students' Assessment of Limitations of Online Teaching Activities at UFLS – UD

In order to summarize the current situation of students' assessment of the limitations of interactive teaching activities at universities, we surveyed students' opinions on choosing limitations of interactive teaching activities at universities with the following contents: Difficulties in communication information between students; Requires teachers and students to proficiently use interactive teaching tools; The learning environment does not stimulate students' initiative and creativity; Requires students to be self-aware and active in learning; The quality of interactive teaching depends heavily on physical facilities (machinery, software, Internet system).

Results of the opinion survey of 373 full-time students (2nd to 4th year of the 2022-2023 school year) of FA, FESP and FIS of UFLS - UD. The quality of interactive teaching depends heavily on physical facilities (machinery, software, Internet system) (85.5% of reviews); Requires students to be self-aware and active in learning (49.3% of reviews); Difficulty in exchanging information between students (46.4% of reviews); Requires teachers and students to proficiently use interactive teaching tools (46.1% of reviews); The learning environment does not stimulate students' initiative and creativity (31.6% of reviews).

The assessment results of the surveyed students show that students identify the limitations of interactive teaching activities at universities. This is an advantage for applying solutions to improve the effectiveness of interactive teaching activities at UFLS - UD because when students clearly understand the limitations of interactive teaching activities at universities, they will actively participate in solutions. The school's solutions to improve the effectiveness of e-teaching activities, in which students are the main beneficiaries.

4. Current Status of Students' Assessment of the Difficulties of Interactive Teaching Activities at University

In order to find out the assessment of students of UFLS - UD about the difficulties of interactive teaching activities at the university, we surveyed the opinions of 373 full-time students (2nd to 4th year of the 2022-2023 school year) of FA, FESP and FIS of UFLS - UD.. The survey results after processing the data show that surveyed students' opinions focus on difficulties in IT infrastructure "Limitations in technology infrastructure (equipment, network speed...)" with the score is 4.17%; "Limitations in appropriate interactive teaching support platform" with the score of 3.55% and difficulties in interactive teaching skills "Limitations in interactive teaching skills (concentration, time management...)" with the score of 4.01%.

Difficulties at other educational levels often arise from learning habits or mastery of information system equipment. Surveyed students' opinions rated the difficulties as only at an average level, specifically: "Because "Familiar with learning using traditional methods" with the score of 3.25% and "Limited skills in using technology for information systems" with the score of 3.17%.

Discussing with students about the most common difficulties students encounter when using the information system, we received comments focusing on difficulties due to unstable network connections and internet connections, especially for students in remote areas. Being far from difficult areas, the quality and efficiency of students' information system activities are affected or even interrupted. Through direct exchange and listening to the opinions

presented by students, currently for students in mountainous areas, in the afternoons when there is often thunderstorms, students cannot participate in the information system due to the electricity and internet systems not working. dynamic. Besides, the information system environment is a difficult factor for students. Most students study at home but are affected by family activities or going to shops outside. Although the internet connection is better, it is affected by the noise of the surrounding environment. In addition, due to the lack of information system skills along with the large amount of knowledge that must be received, students cannot absorb the teacher's lectures smoothly. Especially, in cases where knowledge is not understood, it is very difficult for the teacher to guide and explain carefully when interactive teaching is impossible, so it is very difficult for students with interactive learning. This makes students bored or participate in information systems with the main purpose of taking attendance.

5. Current Status of Students' Assessment of Factors Affecting the Effectiveness of Interactive Teaching Activities at UFLS – UD

In order to find out the assessment of students of UFLS - UD on factors affecting the effectiveness of interactive teaching activities at the university, we surveyed the opinions of 373 full-time students (2nd to 4th year of the 2021-2022 school year) of FA, FESP and FIS, UFLS-UD.

The survey results after processing the data show that surveyed students' opinions focused on evaluating factors affecting the effectiveness of interactive teaching activities at universities ranked in order of priority including: "Skills of teachers (technological capabilities, pedagogical methods in interactive teaching)" with score the of 4.47%; "Student learning culture (level of learner cooperation, habits of using technology in learning,...)" with the score of 4.38%; "Facilities (machinery, software, Internet system)" with the score of 4.28%; "Class size" with the score of 4.05%; "Policy on interactive teaching (support and encouragement of the University and UD)" with an average score of 3.95%; "Training management activities of the School" with the score of 3.76%.

6. Student Evaluation of Activities That University of Foreign Language Studies - UD Needs to Organize to Improve the Effectiveness of Interactive Teaching Activities

In order to find out the assessment of students of UD-UD on the activities that UD-UD needs In order to find out the assessment of students of UFLS-UD on the activities that UFLS -UD needs to organize to improve the effectiveness of the University's interactive teaching activities in the coming time, we surveyed the opinions of 373 full-time students (2nd to 4th year of the 2022-2023 school year) of FA, FESP and FIS of UFLS - UD. The results of the survey of students' opinions on the activities that the UFLS - UD needs to organize to improve the effectiveness of the University's interactive teaching activities in the coming time.

The survey results after processing the data show that surveyed students' opinions focused on evaluating the activities the school needs to organize to improve the effectiveness of interactive teaching activities in the coming time, ranked in order of priority. Priorities include: "Organizing training on information system methods" with a score of 4.07%; "Implement support information channels and answer questions during the information system process" with the score of 4.03%; "Organize training courses on using IT tools/applications in information systems" with the score of 3.99%; "Organize training

courses on how to use the information system" with a score of 3.94%; "Compilation of Information System Handbook" with score of 3.92%; "Organizing information system forum" with score of 3.86%.

Surveyed students' opinions on the activities that UFLS - UD needs to organize to improve the effectiveness of the University's interactive teaching activities in the coming time are the basis for considering and proposing solutions to solve the problem. students' wishes, thereby improving the effectiveness of the School's interactive teaching activities.

Conclusion

Describing the survey process, especially surveying, analyzing, and evaluating the current state of effectiveness of interactive teaching activities at UFLS - UD through Surveying the opinions of 373 full-time students (2nd to 4th year of the 2022-2023 school year) of FA, FESP and FIS of UFLS – UD. Based on the survey results, the strengths and limitations of interactive teaching activities at UFLS - UD were evaluated as well as the opportunities and challenges of online teaching activities at the university in the coming time.

The school is interested in investing in physical facilities and IT infrastructure to serve interactive teaching activities and organizes training courses for teachers and students on using interactive teaching software:

- The school's interactive teaching activities have been implemented for all students right during the Covid 19 epidemic to ensure uninterrupted training activities.
- Faculties have made efforts to implement interactive teaching activities and overcome initial difficulties due to the occurrence and complicated developments of the Covid 19 epidemic.

However:

- There is still a group of students who are not fully aware of the necessity of interactive teaching activities at university.
- The skills and methods of interactive teaching of some teachers are not suitable for the form of interactive teaching.
- Many students are not proficient in information system skills and methods, so they encounter difficulties in the information system process.
- Documents managing the school's interactive teaching activities were issued late in the early stages of the Covid 19 epidemic, so teachers and students were confused in implementation.
- The school's IT infrastructure system is not synchronized and the internet connection is clogged at some times, affecting the effectiveness of interactive teaching activities.
- The school has not implemented many support services, guidance, and timely answers to students' difficulties and problems in information system activities, especially in online assessment and evaluation.

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A Contrastive Study Between Aboriginal Languages & Chinese: From the Writing System to the Second Language Teaching in the Framework of Australian Curriculum

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Abstract

In Australia, both Aboriginal languages and Chinese are the oldest but still alive languages taught as first and second languages in the Australian Curriculum. Although the Aboriginal and Torres Strait Islander people are supposed to be the "First Nation" in Australia, in fact, their languages are spoken dialects and languages without their own writing system. In the late 1830s, when the Bible was first translated into Aboriginal language through Latin symbols, the Aboriginal writing system was established. Basically, the existing Aboriginal writing system is only the English orthography based upon 26 alphabets and 3 vowels transcribing the sound of the Aboriginal languages without meaning. The major concerns of learning Aboriginal languages as a second language are to better understand local Aboriginal language and culture as well as why it plays such a big part in their lives in the country. In contrast, Chinese is a system of complete logographs consisting of a huge number of pictograms. Most of the non-English speaking students from kindergarten to L12 prefer to study Chinese mainly due to the fact that China is supposed to be the second largest economy in the world aiming at economic exploration and the huge market owing the population of 14 billion. However, when they learn Chinese-as-second-language, they find out that it is "too foreign" and "too difficult" as the hardest language to learn in the world. This paper investigates the writing systems and as-a second-language education of Aboriginal Languages and Chinese in Australian Curriculum from a contrastive approach.

Keywords: Aboriginal languages, Torre Strait Islander languages, Chinese, Australian Curriculum, Communicative Strand, Understanding Strand

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Introduction: Aboriginal Languages & Chinese in Australia

In Australia, both Aboriginal languages (including Torres Strait Islander languages) and Chinese are the oldest but still alive languages, and taught as first (L1) & second (L2) languages in Australian Curriculum. Although the Aboriginal and Torres Strait Islander people are supposed to be the "First Nations" in Australia, in fact, their languages are spoken dialects and languages without their own writing system.

In the 1830s, when the Bible was first translated into Aboriginal language through Latin symbols, the Aboriginal writing system was established. The major concerns of learning Aboriginal languages as a L2 are to better understand local Aboriginal language & culture as well as why it plays such a big part in their lives in the country.

In contrast, Chinese is a system of complete logographs consisting of a huge number of pictograms and phonetic compounds. Most of the English-speaking students for kindergarten to G12 prefer to study Chinese mainly due to the fact that China is supposed to be the 2nd largest economy in the world aiming at economic exploration & the huge market of more than 12 million. However, when they learn Chinese as L2, they find out that it is "too foreign", "too difficult" and "too suspicious" (Neilson, 2021) as the hardest language for English (L1) speakers to learn (Perry, 2022), though is one of the most spoken languages in the world.

1. The Introduction and Contrast Between Aboriginal and Chinese Writing Systems

In this section, the writing system including alphabets and vowels of Aboriginal languages and the writing system consisting of different types of characters in Chinese are first introduced and analyzed. Secondly, there is a contrast between the Aboriginal and the Chinese writing systems.

1.1. The Aboriginal Writing System

Basically, the existing Aboriginal writing system is only English orthography based upon 26 alphabets and 3 long & 3 short vowels transcribing the sound of the word of the Aboriginal languages without meaning.

Aa	Bb	Cc	Dd	Ee	Ff
Gg	Hh	Ii	Jj	Kk	Ll
Mm	Nn	Oo	Pp	Qq	Rr
Ss	Tt	Uu	Vv	Ww	Xx
Yy	Zz				

Table 1: Table of Alphabets in Aboriginal Languages

The Vowels in Aboriginal Languages

Generally speaking, most Aboriginal languages gave three short vowel: a, i, u & three long vowels aa [a:], ii [i:], uu [u:]. Whereas, there is an exception in Barunga variety of Kriol in Northern Territory having five monophthongs - i, e, a, o, u & five diphthongs - ai, ei, oi, au, ou.

1.2. The Chinese Writing System

Modern Chinese characters are based upon & modified from the classical characters in Han Dynasty 2,000 years ago, are categorized into six types: (1) pictographs (2) indicatives (3) phonetic compounds (4) ideographs (5) borrowed words (6) transmissives, according to Sham's review in Chapter 3 (Sham, 2002).

Types of Chinese Characters

(1) Pictographs are the iconic symbols which has the etymological origins of pictures of concrete objects. eg. 鸟 "bird" & 马 "horse".
(2) Indicatives represent those abstract notions, such as position & numerals, etc. eg. 上 "above" & 下 "below".
(3) Phonetic compounds, which dominate more than 90% Chinese characters, are formed by a semantic and a phonetic. While the semantic contains the meaning of a word, a phonetic indicates the sound of the word. eg. 河 "river" is a phonetic compound formed by 水 "water " the semantic & 可 /he/ the phonetic.
(4) Ideograph consists of two or more semantics and forms a new idea by combining the meanings of the two. eg. 好 "to love" or "good" is formed by 女 "woman" & 子 " child".
(5) Borrowed words representing a large number of concrete-object words with association with the abstract concepts are borrowed. eg. 高 "tower" has become a borrowed word with the same pronunciation but means "high".
(6) Transmissives are regarded as a type of borrowed words, both involving a semantic and a phonetic. eg. 老 "old" & 考 "old man" can be transmitted mutually because they have the same radical 老 and their meanings are closely related.

1.3. The Contrast Between Aboriginal and Chinese Writing Systems

The relationships among the script, sound and meaning of A. Aboriginal languages & B. Chinese as follows:
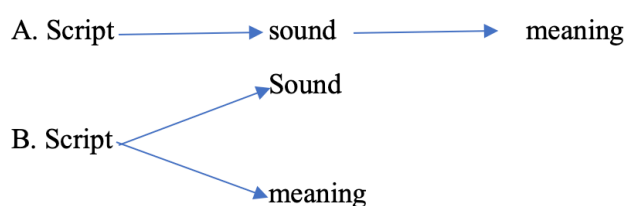
Figure 1: Relationship among script, sound & meaning in
A. Aboriginal languages B. Chinese

Aboriginal writing system are formed by English alphabets and 3 long & 3 short vowels and most of the words are disyllabic containing more than one morpheme. An Aboriginal script directs to sound first and then to meaning. Whereas, a Chinese character is a syllabic, a morpheme, which can stand alone as a word or serve as a morpheme in a compound, two-character or multi-character word. As more than 90% of Chinese characters are phonetic compounds, the scripts connect to sound and meaning simultaneously.

2. Aboriginal & Torres Strait Islander Languages vs Chinese as L2 in Communicating Strand in the Framework of Australian Curriculum

Concerning development and design of languages in Australian curriculum, Scarino (2014) suggests, "Find ways of capturing the nature, scope and level of language learning" that meets the diverse needs and aspirations of contemporary language learners. Although both languages under the Framework of L2 Pathway in Australian curriculum, the nature, scope and level of Aboriginal and Torres Strait Islander languages for meeting the needs of L2 learners are basically different from Chinese.

In Australian Curriculum, L2 teaching of Aboriginal & Torres Strait Islander Languages with Communicating strand (CS) Understanding Strand (US) is through three stages: Foundation to Year 2; (2) Year 3 to 6; (3) Year 7 to 10, and CS is divided into six sub-strands. The major purposes are using the languages in interpreting, creating and exchanging thoughts, feelings and opinions.

Chinese L2 teaching in Australian Curriculum has both Communicating Strand (CS) & Understanding Strand (US) in five stages: (1) F-Year 2; (2) Year 3 & 4; (3) Year 5 & 6; (4) Year 7 & 8 ;(5) Year 9 & 10, as well as there are five Sub-strands in CS. Based upon the following CS tables (Aboriginal L2 in normal print & Chinese L2 in italics), we deal with the contrasts and differences between Aboriginal languages and Chinese L2 Pathways in the Framework of Australian Curriculum.

2.1 Contrasts Between Aboriginal Languages & Chinese L2 Pathways in Australian Curriculum

Socialising/ Interacting	Taking action/Collaborating	Developing language for classroom interaction
Oral – Interacting, participating & taking action	*Written -- Interacting, participating & taking action*	
1. Socialising		
Obtaining & using information	Conveying information	
Oral – Obtaining, processing & using information	*Written -- Obtaining, processing & using information*	
2. Informing		
Participating in & responding to stories, songs, dance & visual design	Creating & performing	
Oral – Participating in, responding to, creating imaginative experience	*Written -- Participating in, responding to, creating imaginative experience*	
3. Creating		
Translating Interpreting & Explaining	Creating bilingual texts	
Translating Interpreting	*Creating own Chinese translation*	
4. Translating		
Express identity		
5. Identity		
Reflecting in intercultural experience		
Reflecting		
6. Reflecting		

Table 2: Table of Sub-strands & threads in Communicating Strand (CS) of Aboriginal Languages and Chinese L2 Pathways in Australian curriculum

In Communicating Strand, there are six sub-strands containing Socialising, Informing, Creating, Translating, Identity & Reflecting in Aboriginal L2 Pathway whereas only five sub-strands in Chinese L2 Pathway ignoring 5. Identity in the previous one. This indicates that Expressing Identity of being Aboriginal people with particular speech communities & culture is significant in Aboriginal L2 teaching, but not for Chinese L2.

There are only three stages including F-Y2. Y3-6, Y7-10 in Aboriginal L2 Pathway, but five stages including (1) F-Y2; (2) Y3 & 4; (3) Y5 & 6; (4) Y7 & 8; (5) Y 9 & 10 in Chinese L2. Due to fact that the uniqueness and complexity of the Chinese orthography, Pinyin, writing by strokes, emphasis on reading texts and translation, as well as intercultural exchange with the adults & communities in the later stages, songs, music and art are not the major activities in the Chinese L2 pathway. Therefore, each stage containing around two years makes the threads become more specific.

Although the description of all the sub-strands are the same wordings, the threads for each of the sub-strand in Aboriginal L2 are completely different from those in Chinese L2 pathway. As the Chinese L2 divides Socialising, Informing & Creating into two parts: 1. Oral, & 2. Written equally which indicates both oral and written texts are significant in Chinese L2 teaching. Chinese is a visible language which consists of complete logography and the scripts correspond to meaning and sound directly, therefore, written texts plays an important roles in L2 teaching. In contrast, Aboriginal & Torres Strait Islander languages L2 are mainly spoken languages with the phonetic transcriptions of English alphabets in their writing system.

In Socialising, interacting with elderlies & visiting their communities are emphasised through all the stages in Aboriginal L2 pathway, but meeting with familiar or unfamiliar adults are encouraged in the later stages in Chinese L2 pathway. The major difference lies on the inherence of manner and culture from the elderlies in the Aboriginal communities through spoken Aboriginal languages but not from written text. Comparatively speaking, written texts are less emphasised whereas participating & responding to stories, songs, dance and visual design, and then creating & performing are the thread of Creating in Aboriginal L2 teaching.

In Translating, from using contextual cues to identify Chinese characters & words through Pinyin, the Romanization phonetic transcriptions of Chinese besides the writing system, in F-Y2 to creating bilingual texts, identifying similarities of Chinese & English syntax & vocabulary and explaining them for transferring cultural & context-specific concepts between Chinese & English in Y9&10. On the other hand, translating & interpreting a range of words & texts into English-Aboriginal L2 version and creating bilingual texts with others in the community are the tread of Translating.

Reflecting on the diversity between young Australians & the youngsters in Chinese-speaking community affecting individuals, identity and beliefs helps intercultural exchanges in Reflecting. Whereas reflecting on their own languages & cultures happens during interacting with Aboriginal peoples through songs, stories, games & art in intercultural exchanges.

2.2. Differences of the Understanding Strand of Aboriginal & Chinese l2 Pathways

According to Australian Curriculum, Understanding Strand (US) means analysing and understanding language & culture in intercultural exchange. The stages divided in US is the same as in CS, and the contrast of different stages in Aboriginal languages and Chinese L2 has been discussed in CS section already. In US, there are five sub-strands in Aboriginal

languages, thus three sub-strands in Chinese L2 pathway. In the following US table (Table 3), the sub-strands and the threads of Aboriginal L2 are in normal print, and those of Chinese are in italic.

Firstly, the sub-strands in Aboriginal and Torre Islander Peoples languages include 1) System of Language, 2) Language variation & change, 3) Language awareness, 4) Role of language & culture, 5) Role of language building. Whereas only the first two & the 4th sub-strands are found in Chinese L2 pathway.

Sound & writing system	Grammar & vocabulary knowledge
Ways of communicating & creating text	Links between language, kin & land
Phonology	*Orthography*
Syntax	*Text*

1.   Systems of Languages

Variability in language use according to social & cultural context	The dynamic nature of language
Variations in language	*Changes in languages*

2.   Language variation & change

Linguistic landscape & ecology	Protocols for working with Aboriginal & Torres Strait Islander languages

3.   Language awareness

The relationship of language & culture
Language choice

4.   Role of language & culture

Maintaining & strengthening language

5.   Role of language building

Table 3: Table of Sub-strands & threads in Understanding Strand (US) of Aboriginal Languages and Chinese L2 Pathways in Australian curriculum

Secondly, the thread in "Systems of Languages" in Aboriginal L2 pathway is divided into four:
1) Sound & writing systems: Producing sounds, stress, intonation pattern of Aboriginal L2, and developing phonemic awareness linked to the writing system;
2) Grammar & vocabulary knowledge: Understanding & using a range of grammar patterns with expansion of vocabulary including inflections & derivations in Aboriginal L2;
3) Ways of communicating & creating text: Analyzing the use, function & relationship of social processes and forms & structures of different types of texts;
4) Links between language, kin & land: Investigate the connections between stories, ceremony, people & land as evident in community.

Thirdly, the thread of Systems of language in Chinese L2 is also divided into four:
1) Phonology: Recognizing & reproducing the four tones with difference for the meanings of words, intonations & rhythms in different age & social groups;
2) Orthography: Recognizing characters as the form of Chinese writing system for reproduction by using strokes & Pinyin as the form of sound system, and infer the meaning & sound to unfamiliar Chinese words;

3) Syntax: Understanding & producing Chinese L2 sentences with nouns, verbs & adjectives in particular grammatical order, and distinguishing the sentences controls by effective Chinese authors;
4) 4)Text: Familiar to text types for meaning prediction, compare the purposes, sentence & text structure of Classical & contemporary texts.

Fourthly, for Language variation & change in Aboriginal L2, the thread is separated into two:
1) Variability in language use according to social & cultural context: Recognizing & Analyzing different words & language pattern reflecting relationships, social & cultural contexts;
2) The dynamic nature of language: Understanding borrowed words, languages & cultures change as a result of contact of new ideas, popular culture, media & new technologies.

Fifthly, Language variation & change in Chinese L2 is similar to that of Aboriginal L2, & divided into:
1) Variation in language: Recognizing Chinese is a major community language in Australia & many countries unlike Aboriginal languages & how the dynamic language influenced by local & global cultures;
2) Changes in language: Identifying the formal language at school & explaining how Chinese language dynamic changes due to social & technological changes.

Sixthly, the third sub-strand in Aboriginal L2 is Language awareness, which is missing in Chinese L2. The thread is separated into two:
1) Linguistic landscape & ecology: Identifying, investigating & comparing the target languages with Indigenous language in other countries for issues of language policy & rights, reform & multiculturalism;
2) Protocols for working with Aboriginal languages & Torres Strait Islander languages: Learning & researching the target languages with respects and understanding of the norms & protocols.

Seventhly, Role of language & culture in Aboriginal L2 is the relationship of language culture exploring connections between identity & cultures of Aboriginal peoples shaping their ways of thinking, behaving & worldview as the role of language. Role of language & culture in Chinese L2 is Language choice reflecting cultural contexts, values & familiarity between participants within or across communities.

Lastly, the fifth sub-strand, Maintaining & Strengthening language, in Aboriginal L2 is missing in Chinese L2 pathway as Chinese is popular in Australia & many countries. It means recognizing the target languages are passed for generations, and should be kept alive & strong. As Indigenous languages, Aboriginal languages is necessary to be maintained & strengthened in Australia.

Conclusion

In conclusion, Framework of Aboriginal language & Torres Strait Islander languages L2 Pathway is similar to that of Chinese language L2 Pathway in Australian Curriculum basically. The contrasts between them are mainly due to the differences between the two writing systems & phonetics, pedagogical approaches, values, cultures, popularity of the target languages in Australia and the world.

Comparatively speaking, the goal of teaching and learning Aboriginal languages L2 is for the maintenance of the Indigenous languages, whereas the design of Chinese L2 is more knowledge-based approach. In other words, Aboriginal L2 teaching is more vivid, creative and interesting through songs, stories, games & art, but Chinese L2 emphasizes more on written characters & texts in understanding context in addition to Pinyin.

Aboriginal L2 learners just learn the different sounds of Aboriginal language only as the Aboriginal English writing system without much difference from their English L1. However, Chinese L2 learners not only study the orthography of logographic Chinese characters in the writing system, which they must reproduce characters by strokes, and read the boring lengthy texts in addition to Pinyin as the form of Chinese phonetics and then guess the unfamiliar words. Therefore, English L1 learners learn Chinese L2 as a completely new foreign visual writing system consisting of logography with higher complexity, higher difficulty and higher cognitive levels creating heavier cognitive load (Sweller, 2011) consisting of logographs, strokes, pinyin and guess in Communicative Strand. This is based upon the psychological and educational psychological analysis as one of the major reasons why English L1 learners' complaint that Chinese is "too foreign, difficult and suspicious" (Neilson, 2021) as the hardest language in the world (Perry, 2022). In Australia, many English L1 learners drop Chinese L2 course after Y6 if they have started learning Chinese L2 in primary schools.

Furthermore, Systems of language in Chinese L2 pathway consisting of four parts different from that of Aboriginal L2 with some similarities except that Orthography in Chinese focuses on recognizing characters as the form of Chinese writing system for reproduction by using strokes & Pinyin as the form of sound system, and infer the meaning & sound to unfamiliar Chinese words. In other words, English L1 learners are expected to be able to read the logographic characters, write the Chinese characters by strokes as well as pronounce the Chinese words by Pinyin, and then guess the unfamiliar words as a visible language. In fact, most of the Chinese L2 learners could speak fluent Chinese through Pinyin but unable to memorize a large number of isolating Chinese logographs without any cues. That means they perform well in oral practice only because English L1 is a phonetic language containing 26 alphabets, but poor in recognizing Chinese orthography or reading and writing texts due to the distinctiveness of Chinese (Scrimgeour et. Al., 2014) which is far beyond their scope. This is the from the linguistics point of view to analyze the second reason why it is "too foreign, difficult and suspicious" to learn Chinese L2 (Neilson, 2021) as the hardest language for English L1 speaker to learn in the world.

Unlike Chinese is world-widely used as popular community language, Aboriginal L2, the Indigenous languages, has to be learned through interactions with the elderlies in the communities for maintenance and strengthening the languages with cultural identity, language awareness and respects as they have been transmitted from generation to generation. Meanwhile, the ecology of comparing the target languages with other Indigenous languages in the world concerns about issues of language policy & rights, social reform & multiculturalism.

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Learning of Glutinous Rice Community Achieves Sustainable Development Goals (SDGs) in Sakon Nakhon Province, Thailand

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Abstract

The production and consumption of glutinous rice has been a vital part of the local culture and daily lives of the farmers in the Greater Mekong sub-region. The production of glutinous rice provides food security to rural farmers and consumers even in the face of economic, social, and environmental changes. This paper presents the process we used to develop farmer performance and community enterprise towards food security, family and community security, and preservation of biological and cultural assets. The researchers used Participatory Action Research Methodology in Organic Glutinous Rice Seed Community Enterprises and Na Yor Community Enterprise. The research approach involved the principal participation of the stakeholders, including observation, community preparation, lesson learning, knowledge transfer, experimentation, follow-up, and appraisal. The researchers used production standards are mechanisms for development toward SDGs. The study found that a deliberate process eventually brought about an increase in revenue of 19% per month for selling rice seed and processing products. The community enterprises got the certification of organic rice production standards and food safety standards for local wisdom rice production. The researchers discovered more than 30 indigenous glutinous rice varieties in the community and isolated them for future use. We still have the project impact on environmentally friendly production that can reduce the carbon-free more than 10 kg.CO2e, highlighted the importance of inherited wisdom for learning, and strong networks among government and private sectors. Now the community enterprise is the learning center for other communities and change to be SDGs Localization learning area of Thailand.

Keywords: Glutinous Rice, Sustainable Development Goals, Community

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Introduction

The Mekong region is where most glutinous rice is grown. The biodiversity of glutinous rice varieties in both the Mekong sub-region and Thailand are uniquely important to the communities that exist along the Mekong River. Both sticky and non-sticky rice varieties are widely consumed in Thailand, with the northern and northeastern regions of the country producing and consuming the most glutinous rice (Falvey, 2010). The farmers, the majority of whom are elderly, have been planting glutinous rice for more than 30 years, and typically utilize terrain that primarily relies on rainfall for harvest. While there are many other types of glutinous rice, the most popular cultivar among these farmers is RD6, which they cultivate from seed. However, the farmers don't have a sufficient supply of certified glutinous rice seeds or high-quality seeds, which requires they purchase seed from the government.

Glutinous rice is utilized in the northeast as a regional product for consumption (Suebpongsang, Ekasingh, & Cramb, 2020), as well as in traditional ceremonies, including the 'Boon Khao Jee, Boon Jak Khao' ceremony and various other religious and auspicious rituals. However, the majority of glutinous rice products in the community, such as grains, brown rice, Hang Rice, Khao Mao (pounded unripe rice), snacks, and various other rice-based products (Figure 1), do not meet safety standards (Sattaka, 2019).

The aim of this project is to enhance food security, family well-being, and preserve biological and cultural assets. These goals align with the Sustainable Development Goals (SDGs) associated with social, economic, and environmental conservation. This project also seeks to improve seed production and conservation by ensuring that glutinous rice seed meets established standards, that production processes meet Thai FDA standards, and by driving marketing and tourism initiatives in Sakon Nakhon province. This paper will in turn present both the results and lessons learned stemming from this project.

Figure 1: Glutinous rice products

Glutinous Rice in Thailand

Currently, Thailand, Vietnam, and Laos are the top glutinous rice producing countries in the world, producing a total of around 12 million tons. Approximately 6.0 million tons of glutinous rice are produced in Thailand, followed by 3.5 million tons in Vietnam and 3.2 million tons in Laos. The Department of Internal Trade, pursuant to Ministry of Commerce policies, has project the demand for rice in 2023 to be 27.6 million tons. Therefore, the Rice Department has set the rice production target for 2022/23 at 30 million tons of unmilled rice, divided into 9.1 million tons of jasmine rice, 1.8 million tons of Pathumthani fragrant rice (Thai fragrant rice), 12.9 million tons of white rice (non-waxy rice), 6 million tons of glutinous rice, and 0.2 million tons of niche market rice. Production of Pathum Thani fragrant rice, white rice, sticky rice, and niche market rice is expected to hit 2022/23 targets, except

for jasmine rice, which at 2.3 million tons of rice is expected to exceed its production target (Office of Agricultural Economics, 2022).

Thailand's sticky rice export volume in 2022 was 170,000 tons of milled rice, accounting for 2.2% of the total export volume for that year. The main export market for Thai sticky rice in 2022 was China (42.9%) followed by Laos (11.8%), the United States (10.8%), and Vietnam (6.4%). In 2023, the export volume of Thai sticky rice in the first four months was 0.05 million tons with a value of 32.4 million USD, decreasing -19.8% year over year (YoY) for 2022 and -7.3% (YoY) for 2023. The average export price is 724.5 USD per ton (+15.1% YoY). The main export market for Thai sticky rice in the first four months of 2023 was China (47.1%), followed by the United States (13.1%), Laos (7.6%), Vietnam (5.5%) and Hong Kong (3.3 %) (Sowcharoensuk, 2023).

Glutinous Rice Utilization

For Thai people, glutinous rice is not only a matter of food security but is also a crucial aspect of local culture and daily life (Singanusong & Mingyai, 2019). In rural areas, particularly in the northeastern region of Thailand, the per-person consumption of glutinous rice is approximately 120 kilograms per year, while in Bangkok, it averages just under 80 kilograms per person per year. This difference is notable, especially among those in Bangkok who have migrated for work from the northeastern and northern regions. Glutinous rice is rich in nutrients, approximately 80% of which is starch. Additionally, it contains various beneficial micronutrients, including minerals such as phosphorus, iron, calcium, and vitamins B and E. Moreover, it features active biological ingredients such as phenolic compounds and flavonoids, which possess antioxidant properties (Phanthurat & Thatsanasuwan, 2023). Thus, consuming glutinous rice not only provides energy but also offers high nutritional value.

Glutinous rice has been utilized not just for edible products but for non-edible products as well. Glutinous rice is occasionally used on an industrial scale for products such as rice flour, beverages, and cosmetics. Most local community processing involves primary processing, focusing on the creation of various desserts for household consumption and sale to the public. Farmers, ranging from the household level to the enterprise level, leverage their expert knowledge of glutinous rice cultivation to diversify into other products, such as brown rice, Hang rice, Khaotan (rice cracker), Khao Mao, Khao Tom Mad (bananas with glutinous rice), Khaomak (sweet fermented rice), rice wine, and rice toffee (Sattaka, Muengpak, Xuan, & Mueangkhot, 2020). While some of these products adhere to food safety standards, others do not. Therefore, supporting and encouraging the adoption of glutinous rice production standards, such as GAP (Good Agricultural Practice), Organic, and Food Safety Standards of the Food and Drug Administration, provides an opportunity to expand marketing channels and reduce environmental impacts.

Dao Laum Deuan (DLD) Community Enterprise

DLD, an organic glutinous rice seed community enterprise consisting of 8 communities, is located around the Chalermphrakiat Sakon Nakhon campus of Kasetsart University. Although cultivating rice from certified organic rice seeds is necessary to produce organic rice, for more than 10 years these communities have been producing rice from seed from their own harvests. Because this seed often fails to meet certified health and quality standards, the quality of the rice grown from that seed inevitably suffers, which in turn lowers rice production and results in insufficient rice for local consumption. This situation has

prompted the authorities in Sakon Nakhon province to launch policies to support the local organic rice production in the area. The ultimate goal is to increase production capacity and production yields in order to ensure local food security, encourage job security, and boost the community's income.

Na Yor Community Enterprise

At Na Yor community enterprise, Khao Mao is produced by over 200 households, making it the largest Khao Mao producing community in Sakon Nakhon province. Production involves cultivation of various varieties of glutinous rice. However, the farmers have not conducted soil quality analyses nor have they implemented soil improvement practices for rice cultivation quality. Additionally, the presence of mixed seeds in the paddy fields has negatively impacted production yields. Thus, the researchers initiated a project aimed at enhancing the safety standards of Pounded Unripe Rice in order to boost farmers' income and ensure the sustainability of the quality of life. The research goal is to obtain Thai FDA food safety standard certification for Khao Mao or Pounded Unripe Rice. Thus, the project employs production standards in order to achieve Sustainable Development Goals (SDGs) and to reduce negative environmental impacts. For glutinous rice seed, we adhere to the seed standard of the Ministry of Rice, implement the Good Agricultural Practices (GAP) standard for production management, and follow food safety standards for Kaow Mao production.

Methodology

The participatory action research methodology implemented by the 93 members of the organic rice community enterprises in DLD and Na Yor is in shown in Figure 2. The process is comprised of:

1. Prepare the community to explore the problem and to document relevant economic and social factors.
2. Reflecting on the problems raised in the discussions. This enabled the researchers to discover the actual needs of the community, and to provide the appropriate training.
3. Knowledge transfer to farmers and their descendants related to soil improvement, seed production, rice production management, and glutinous rice processing. This enabled the famers to successfully achieve certifications in seed standards, production standards and Thai FDA standards.
4. Follow-up.
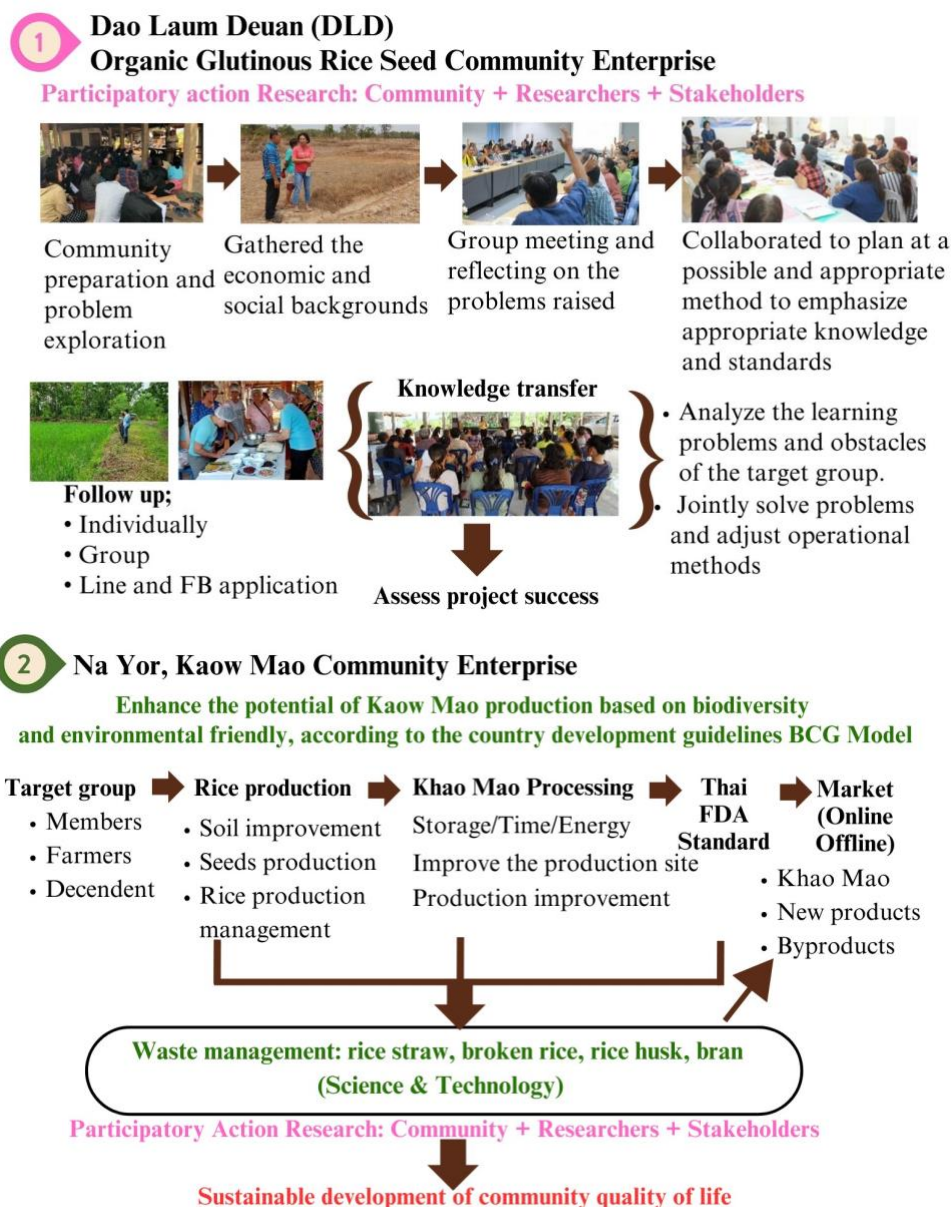
Figure 2: Research methodology of DLD and Na Yor Community Enterprise

Data Collection

The data were collected through a combination of group meetings, lessons learned sessions, observations, and scheduled interviews. The interviews were designed to include baseline socio-economic information and detailed insights into the existing glutinous rice production processes. It also covered knowledge about Rice Department, adherence to organic rice standards and Good Agricultural Practices (GAP) for rice production management, and compliance with glutinous rice food safety standards.

Data Analysis

Descriptive analysis was employed, drawing insights from group meetings, lessons learned sessions, observations, and interviews. The knowledge gathered from the research, combined with community input, was subsequently synthesized. Descriptive statistics, including percentages, averages, standard deviations, and statistical references such as social and

economic background, encouragement in glutinous rice production, and knowledge of glutinous rice production and organic rice production/GAP, were utilized. This comprehensive analysis aimed to assess the glutinous rice community learned with regards to achieving sustainable development goals.

Result

1. DLD, Organic Glutinous Rice Seed Community Enterprise

In the process of producing organic glutinous rice seeds that meet both seed and organic standards, participants not only acquire knowledge through expert training but also benefit from the experience and success of seed producers. This learning approach instills motivation among members of the glutinous rice production community to meet production standards. This is particularly crucial in group production, where the formulation of clear goals and agreements is essential for the collective strength and stability of the group. The organic rice field has been identified as a complex and challenging system, evolving over time under the ongoing influence of technology and environment. Its performance is contingent upon the intricate interplay of numerous interacting elements (Orlando et al., 2020). Drawing insights from the lessons learned by the DLD Organic Rice Seed Community Enterprise Group (Figure 3), the project aims to:

- Establish shared goals and communicate operational procedures to all members.
- Evaluate operational outcomes, and identify challenges and obstacles.
- Facilitate the exchange of information and knowledge to devise effective solutions for overcoming obstacles and ensuring success in seed production.
- Strategically plan and coordinate overall production operations.

Figure 3: Meeting of DLD Organic Rice Seed Community Enterprise

The DLD members share a common goal of producing organic glutinous rice seeds to enhance sustainability in agriculture. The production process for agricultural glutinous rice relies on a rainfed system, emphasizing the dependence on natural rainfall rather than irrigation for cultivation. Most farmers, with an average age of over 50, have a basic level of education. Most agricultural areas consist of small land plots, approximately 2 hectares in size, with glutinous rice production falling below the national average for rice production. By promoting the production of organic glutinous rice seeds through participatory learning and training methods, every farmer involved in the project gains a deeper understanding. Most farmers understand the necessity of avoiding the mixing of seeds with chemicals, and that the cultivation of off-season rice should be conducted in areas with ample water sources. Farmers have acquired increased knowledge, particularly with regards to rice seeds, soil preparation, weed prevention, and disease and pest prevention. Additionally, there is an emphasis on proper storage practices. This enables them to plan their production in accordance with both

non-organic and organic rice seed standards. The study revealed that farmers effectively applied their knowledge by adhering to the principles of producing organic rice seeds. This aligns with the findings of the study by Issahaku *et al.*, which reported that the training resulted in benefits leading to changes in participants' socio-economic statuses and cognitive improvements (Issahaku, Obeng, Akudugu, & Yeboah, 2022). Over 95% of farmers placed significant emphasis on crucial practices, including the use of seeds free from chemical mixtures, avoiding growth promoters and chemical fertilizers, ensuring thorough drying of rice before storage, and selecting storage locations with proper ventilation. However, 28% of farmers did not follow the recommended practice of cutting mixed rice during the tillering and flowering stages. Additionally, 23% of farmers showed a tendency to neglect the use of green manure for soil improvement and the regular weed removal.

By participating in the project, farmers acquired enhanced knowledge and skills, specifically in regards to adhering to both organic and non-organic rice seed standards. Despite this progress, members found it necessary to fine-tune their practices further to achieve optimal production results for food security and job security. Glutinous rice seeds that do not meet seed standards, and sticky rice produced in excess of farmers' needs, are offered for sale, which creates jobs and additional income for farmers. This led to an increase in revenue (Figure 4) and reinforced food safety standards set by the Thai FDA. As a result, the DLD has become a learning center for glutinous rice product development, and a model for other communities.

Figure 4: Glutinous rice seeds of DLD Organic Rice Seed Community Enterprise

2. Na Yor Community Enterprise

The aim is to enhance the potential of Khao Mao production in Figure 5 to meet safety standards, thereby fostering sustainable increases in income and the quality of life. This is achieved through participatory research processes that involve preparing communities and collaborating with network partners. The approach includes problem analysis, the establishment of action plans, the transfer of operational knowledge, and the exchange of information in the area. The process is closely monitored, and collaborative efforts are directed accordingly. The operations are structured into three crucial components, each adhering to specific standards: the quality of native glutinous rice seeds used in Khao Mao production with seed standard of Thai Ministry of Rice, the management of the rice production system with GAP standards, and the production of Khao Mao per Thai FDA standards, ensuring environmental friendliness.

Figure 5: Khao Mao or Pounded Unripe Rice

The operational results revealed that the Nar Yor Community has over 30 varieties of native glutinous rice (Figure 6). After the seed production knowledge transfer gained from training and hands-on field experience, farmers were able to produce seed with a remarkable purity range of 97-100%. Contamination from other rice varieties was minimal, accounting for less than 3%, while the germination percentage ranged between 97-100%. Additionally, the humidity level was maintained at 10-14%.

In the rice production management, soil quality is analyzed before applying the appropriate amount of fertilizer. In addition, the emphasis is on not burning stubble, which produces pollutants dangerous to both humans and the environment and destroys soil fertility, but rather on plowing it down and utilizing it as fertilizer to mitigate environmental impact. Therefore, properly managed crop stubbles have the potential to offer significant economic benefits to farmers while also serving as a means to protect the environment from severe pollution (Abdurrahman, Chaki, & Saini, 2020).

Figure 6: Biodiversity of native glutinous rice for Khao Mao production

In the effort to enhance the production efficiency of Khao Mao to meet safety standards, it was discovered that farmers engaged in Khao Mao production lacked knowledge about food safety standards and did not know how to apply Thai FDA standards. Subsequently, the research conducted an assessment of farmers' knowledge before transferring information on rice production to meet safety standards, yielding an average pre-test score of 19. Following the knowledge transfer, the farmers' average knowledge score significantly increased to 19.24 out of a possible full score of 25. The most common misunderstanding among farmers pertains to the cleaning of machine tools in rice production, emphasizing the necessity to clean them both before and after each use. Additionally, it's crucial to ensure that livestock

pens or animal-raising areas are not located near the rice production site. During work, it is mandatory to wear a hair covering, and the use of jewelry is prohibited while making Khao Mao.

Developing the production of Khao Mao to Thai FDA standards has led to significant improvements in the area and production process in Figure 7. The main points include refraining from activities that create dust and smoke, installing a wastewater treatment tank, and adjusting the production process to align with environmental standards. By shifting from firewood to liquid propane gas for energy in Khao Mao production, the quality of the rice has been maintained, and dust and smoke reduced. This has resulted in a notable reduction of about 19% in production costs while meeting the stringent standards set by the Thai FDA. Additionally, the carbon footprint associated with Khao Mao production has substantially decreased, dropping from 10 kg of CO_2 per 1 kg of Khao Mao to just 0.12 kg CO_2 after the improvements.

Figure 7: Developing the production of Khao Mao to Thai FDA standards

Conclusions: Learning of Community Achieves SDGs

In the pursuit of achieving the SDGs, we employ the Bio, Circular, and Green Economy Model (BCG Model). Our focus is on preserving the biodiversity of rice species, enhancing the production process to meet established standards, and utilizing waste efficiently. Glutinous rice community development aims to establish career stability and generate incomes to achieve SDGs. For the lessons learned from the project, we must:

- Develop primarily based on the needs of the community.
- Encourage participation at every stage of development with farmers in the community.
- Develop production from upstream, middle stream, downstream to meet production standards and environmental criteria.
- Select and adapt technology to the local context, considering available resources and biodiversity.
- Transfer relevant knowledge into practical application in the area.
- Transfer appropriate knowledge to upskill and reskill the community.
- Continue development with people of all ages to achieve sustainable development in the community.
- Elevate production to meet safety and environmentally friendly standards.
- Implement strong community enterprise management practices.
- Establish a robust network of partners to support ongoing development.
- Share, develop a network, and expand results to create a learning society.

Furthermore, the acquisition of agricultural knowledge and information, crucial for achieving the SDGs, is positively correlated with farmers' perceptions. Researchers recommend enhancing farmers' access to education, training, and information, as well as fostering collaboration with stakeholders. These measures are proposed to have a positive impact and increase the utilization of agricultural knowledge and information (Maldayo, Senapathy, & Bojago, 2024). Additionally, positive impacts on socioeconomic factors were found to be significantly associated with the learning methods employed by extension agents and the participatory monitoring and evaluation of smallholder farmer extension activities (Odongo, Opio, Mwesigye, & Bariyo, 2023).

Acknowledgements

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Development of Informative Reports for Analysis of Student Admission, Case Studies for the Faculty of Industrial Education and Technology, KMUTT

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Abstract

Before Covid-19 crisis, the results of undergraduate admission were reported using paper-base with raw data. As a result, the administrators were unable to apply the unclear information for decision in a timely manner. This case study was performed by the academic affair of the Faculty of Industrial Education and Technology, King Mongkut's University of Technology Thonburi (KMUTT), Thailand. The undergraduate admission process was analyzed in group discussion according to the SIPOC model, found that administrators as suppliers wanted to get the dashboards of informative reports which must be accurate and up to date. The online informative reports were then developed using Looker Studio program to make the big data easier to determine for student admission management. The dashboards could display various information such as number of applicants in each academic year, round, academic programs, and category. The system could show grade point average and school of applicants, and which programs or categories were the most interested. There are usually 4 rounds of admission by Thai University Central Admission System (TCAS) for 8 undergraduate programs in an academic year with >10 categories, resulting in big data analysis. After applying the Looker Studio program to present the online informative reports for 5 academic years since 2019, the satisfaction of administrators and related staffs as the target group was evaluated using online questionnaire with 5-point Likert scale. The opinion of 22 respondents showed that they were strongly agree with the online informative reports which are very appropriate to understand and analyze.

Keywords: Looker Studio, Faculty of Industrial Education and Technology, Thai University Central Admission System (TCAS)

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Introduction

King Mongkut's University of Technology Thonburi can trace its origin to the Thonburi Technical College (TTC) which was established on 4 February 1960, by the Department of Vocational Education, Ministry of Education. TTC had the mission of training technicians, technical instructors, and technologists. By the Technology Act, enacted on 21 April 1971, three technical institutes are under the Department of Vocational Education: Thonburi Technical Institute (TTI), North Bangkok Technical Institute, and Nonthaburi Telecommunication Institute. They were combined to form one degree-granting institution under the name King Mongkut's Institute of Technology (KMIT) spread across three campuses. TTC thus became KMIT Thonburi campus. In 1974, KMIT was transferred from the Ministry of Education to the Ministry of University Affairs. A new technology act was enacted on 19 February 1986: the three campuses of KMIT became three autonomous institutes, each having university status. KMIT Thonburi campus became King Mongkut's Institute of Technology Thonburi (KMITT). Now KMUTT KMUTT has the following Faculties and Schools Faculty of Engineering (FoE), Faculty of Science (FSci), Faculty of Industrial Education and Technology (FIET), School of Liberal Arts (SoLA), School of Information Technology (SIT), School of Architecture and Design (SoA+D), School of Energy Environment and Materials (SEEM), School of Bioresources and Technology (SBT), Join Graduate School of Energy and Environment (JGSEE), Institute of Field Robotics (FIBO), Graduate School of Management and Innovation (GMI) and College of Multidisciplinary Sciences [1].

The Faculty of Industrial Education and Technology (FIET) has 3 degrees Bachelor's Degree, Master's Degree, and Doctoral Degree is total of 18 programs. The Bachelor's Degree has 8 programs Civil Engineering, Mechanical Engineering, Electrical Engineering, Production Engineering, Packaging and Printing Technology, Applied Computer Science-Multimedia, Industrial Technology and Education, Technology, and Mass Communication. The Master's Degree has 7 programs composed of a Master of Science in Industrial Education Program in Mechanical Engineering, Electrical Engineering, Production Engineering, Civil Engineering, Learning Technology and Mass Communication, Computer and Information Technology, and a Program in Packaging Technology and Printing Innovation. Also, the Doctoral Degree has 1 program such as the Doctor of Philosophy Program in Learning Innovation and Technology.

Application channels for students to bachelor's degree programs of the Faculty of Industrial Education and Technology depend on the Thai University Central Admission System (TCAS). It has 4 rounds to apply, and another round has many projects such as:

    Round 1: Portfolio has 3 projects to apply such as Active Recruitment 1st, Direct Admission for Academic Excellency and Direct Admission for Gifted Student and Pra Jom Klao Scholarship

    Round 2: Quota has 7 projects to apply such as Active Recruitment 2nd, Direct Admission for Vocational Certificate Students, Quota for Printing and Packaging Business Successor, Direct Admission for Development of Teachers' Descendants, Direct Admission with TGAT/TPAT for good students with morals, Direct Admission with TGAT/TPAT for Expanding Educational Opportunity and Direct Admission for producing the personnel in Science Technology and Innovation

    Round 3: Admission has 1 project by the Thai University Central Admission System

Round 4: Direct Admission has 2 projects such as Active Recruitment 3rd and Direct Admission for producing the personnel in Science, Technology, and Innovation

The reporting of past student admissions results has traditionally been conducted using paper methods, relying on big data and raw data that may lead to unclear and unanalyzable information. This applies to various aspects such as school data, GPAX (Grade Point Average), field applications, and round and project applications, among others. The use of paper-based methods hinders the effective and prompt utilization of the data. As a result, there is a recognized need to develop a more efficient student admission reporting process. This development involves the creation of informative reports designed for the analysis of student admissions. The goal is to ensure that the reported data is accurate and up to date, with clear references to data sources and survey times. The reporting process aims to be comprehensive, covering a wide range of topics and subjects. It also prioritizes speed and timeliness to facilitate immediate utilization of the data. Additionally, this research initiative extends beyond reporting to address the design and development of the curriculum within the Faculty of Information Technology and Electrical Engineering (FIET). The purpose is to inform the executives of FIET, enabling them to strategically plan the faculty's curriculum design to better meet the needs of the students. This comprehensive approach aims to enhance the overall effectiveness and responsiveness of the student admission reporting process and curriculum development within IFET.

Objective

This research had3 objectives for Development of Informative Reports for Analysis of Student Admission, Case studies for the Faculty of Industrial Education and Technology, KMUTT.

1. To develop the undergraduate student admissions reporting system into an information format.
2. To assess the effectiveness the undergraduate student admissions reporting system into an information format.
3. To evaluate the satisfaction the undergraduate student admissions reporting system into an information format.

Methodology

Step 1: Study the Current Data Situation Through SIPOC Model

Utilize the SIPOC (Supplier, Input, Process, Output, Customer) By the result Executive of FIET, they want to information report not data report.

SIPOC = Model as a tool for analyzing and understanding the current data processes. This model helps define the relationships between suppliers, inputs, processes, outputs, and customers, providing insights into the workflow.

Step 2: Study Standardized Information Reporting Systems

Investigate information reporting systems that adhere to standards. This can involve exploring methods such as Business Intelligence tools, dashboards, and Key Performance Indicators (KPIs) to ensure reliable and decision-worthy data. I choose the Looker studio because Looker Studio is update information real time.

Step 3: Design and Plan Existing Data for Reporting System Integration

Designing and planning existing data involves considering user requirements and organizing data systems to efficiently support reporting. This includes structuring data to enhance its usability within the reporting framework by Google Sheet.

Step 4: Implement a Reporting System, Develop Quality Assessment Models and Satisfaction Surveys (Seeking Quality)

Create a reporting system with defined Key Performance Indicators (KPIs) and develop assessment models to measure the efficiency of the system. Additionally, design satisfaction surveys to gauge user contentment and quality by Looker Studio.

Step 5: Evaluate System Quality by Experts and Assess User Satisfaction With the System

5.1 Evaluate System Quality by Experts
The Purposive Sampling by experts who can employ various methods such as system testing, code reviews, and peer assessments to identify areas for improvement and refinement.

Main Topics	Main Topis
Satisfaction of Informative Report	- Suitable Data - User-Friendly - Appropriate Reporting of Results

Table 1: The contents for satisfaction evaluation in Questionnaire

5.2 Assess User Satisfaction with the System
Reporting the results of undergraduate student admissions in the past has been done using paper, and the reports consist of raw data. This has led to unclear information for the recipients, making it challenging for them to quickly and effectively utilize the data for further purposes.

Main Topics	Sub-topics
Suitable Data	- Data Accuracy - Data Completeness - Usability of Data for Beneficial Purposes
Report System	- User Friendly - Appropriate Reporting of Results

Table 2: The contents for satisfaction evaluation in Questionnaire

Step 6: Evaluate Satisfaction with the System

6.1   Statistical Measures Used for Evaluation:
6.2   Data Analysis Procedures:
6.2.1   Analysis of Survey Data:
         Calculating the mean ($\bar{x}$) and standard deviation (SD) for quantitative analysis.
6.2.2   Scoring Based on Boonchom's Concept (2013):

Evaluating responses according to Boonchom's framework, where scores are assigned on a scale of 1 to 5, representing the levels of excellence, high satisfaction, moderate satisfaction, low satisfaction, and the lowest satisfaction, respectively.

6.2.3   Interpretation of Satisfaction Levels:
Interpreting the analysis results based on user satisfaction criteria:
Mean scores of 4.51–5.00 indicate the highest satisfaction.
Mean scores of 3.51–4.50 indicate high satisfaction.
Mean scores of 2.51–3.50 indicate moderate satisfaction.
Mean scores of 1.51–2.50 indicate low satisfaction.
Mean scores of 1.00–1.50 indicate the lowest satisfaction.

Results

From the comparison of the traditional undergraduate student admission reporting method is shown in Figure 1, it can be observed that the data presentation consists solely of tables indicating the number of candidates who passed the selection process for each project within each academic program. However, with the development of the new format for reporting undergraduate student admission outcomes (Figures 2 and 3), it provides detailed information. This includes applicant data, interviewee information, system-verified data, Teacher's Council data, King Mongkut's University data, and applicant data for all academic disciplines and projects. The data is categorized according to application types, applicant's school names, chosen academic programs, and applied projects. This enables users to effectively utilize the data for strategic planning, defining admission strategies for undergraduate students, and future curriculum development.

Figure 1: Undergraduate Student Admission Outcome Reporting (Traditional Format)
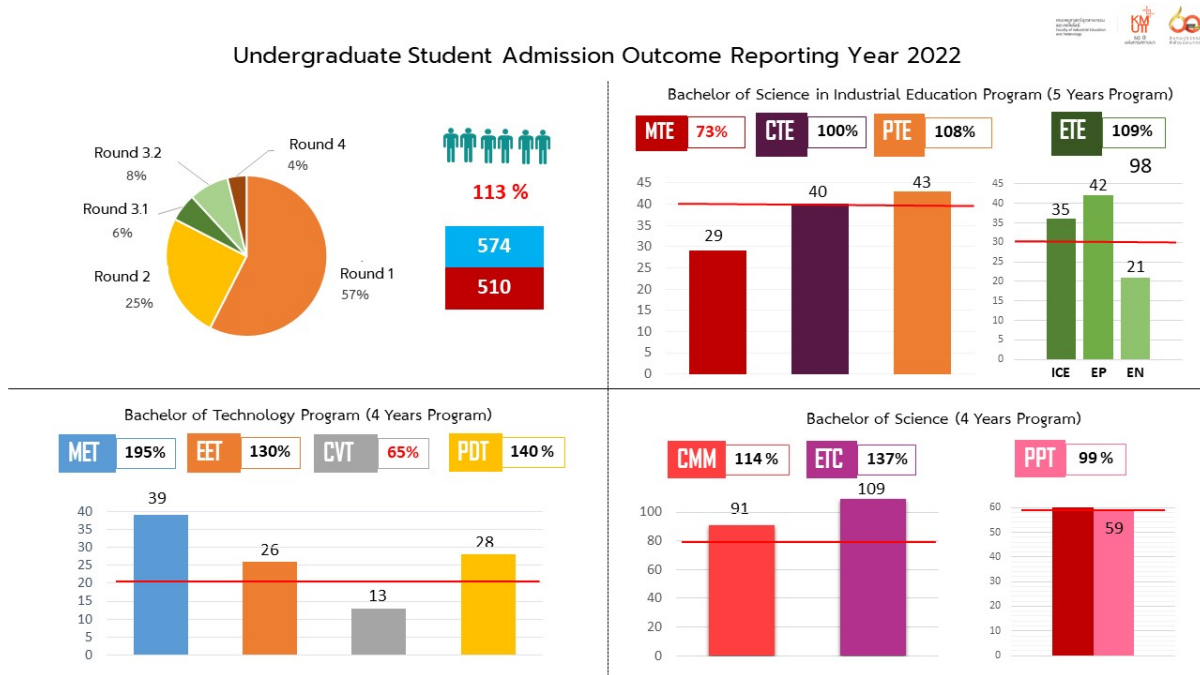
Figure 2: Undergraduate Student Admission Outcome Reporting (New Format)
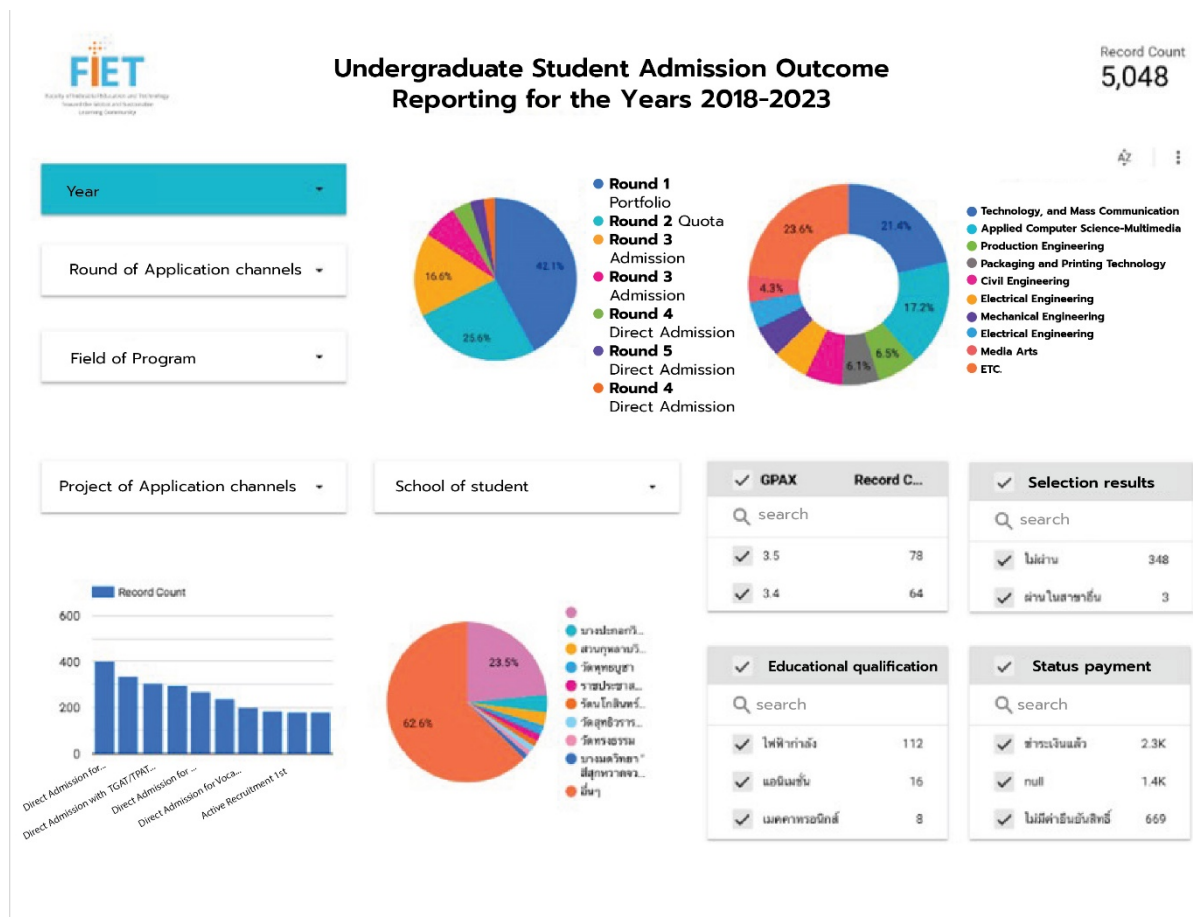
Figure 3: Undergraduate Student Admission Outcome Reporting for the Years 2018-2023
(New Format)

Based on the satisfaction survey study regarding the student admission reporting within the
Faculty of Education (Information Report), the findings are as follows:

1. Evaluate System Quality by Experts

Evaluate the system's quality by engaging experts who can employ various methods such as system testing, code reviews, and peer assessments to identify areas for improvement and refinement.

Title for evaluation	$\bar{x}$	S.D.	Level of Satisfaction
1. Suitable Data	4.67	0.58	The Highest
2. User-Friendly	4.00	1.00	High
3. Appropriate Reporting of Results	4.67	0.58	The Highest
Overall Average Evaluation Result	**4.44**	**0.72**	**High**

Table 3: The Result Evaluate System Quality by Experts (N=3)

Table 3 showed the result of Evaluate system by Experts ,focuses on assessing various aspects, including Suitable Data, User-Friendliness, and the Appropriate Reporting of Results. The experts provided ratings on a scale of 1 to 5, and the results were analyzed to derive an overall assessment.

Suitable Data : The system received an impressive average rating ($\bar{x}$) of 4.67 with a standard deviation (S.D.) of 0.58. This indicates a high level of agreement among experts regarding the system's capability to handle suitable data. The consensus was that the system excelled in this aspect, earning it the designation of "The Highest" level of satisfaction.

User-Friendly: With an average rating of 4.00 and a standard deviation of 1.00, the system demonstrated a high level of user-friendliness. While there was a slightly greater variability in expert opinions compared to other criteria, the overall assessment remained at a "High" level of satisfaction.

Appropriate Reporting of Results: Similar to the Suitable Data criterion, the system received an impressive average rating of 4.67 with a standard deviation of 0.58. The unanimous agreement among experts on the excellence of the system's reporting capabilities warranted the designation of "The Highest" level of satisfaction Overall Average Evaluation Result : Combining the evaluations across all criteria, the system achieved an impressive overall average rating ($\bar{x}$) of 4.44, with a standard deviation of 0.72. This reflects a high level of consistency in expert opinions, resulting in an overall assessment at the "High" level of satisfaction.

The findings of this evaluation underscore the exceptional quality of the data for beneficial purposes, particularly in terms of accuracy, completeness, and usability. The consistently high ratings across all dimensions highlight the reliability and effectiveness of the data, providing valuable insights for stakeholders and decision-makers.

2. Assess User Satisfaction With the System

Evaluate user satisfaction by the sample group consists of individuals directly involved in the Executives of Faculty Industrial Education and Technology. And who responsible for admissions, and staff members assigned to carry out tasks.

Title for evaluation	$\bar{x}$	S.D.	Level of Satisfaction
1. Suitable Data			
1. Data Accuracy	4.68	0.57	The Highest
2. Data Completeness	4.32	0.72	High
3. Usability of Data for Beneficial Purposes	4.73	0.63	The Highest
Overall Average Evaluation Result	**4.58**	**0.64**	**The Highest**

Table 4: The Result Assess User Satisfaction with the System of Suitable Data (N=22)

Table 4 showed the result of Assess User Satisfaction with the System of Suitable Data, this research delves into a comprehensive evaluation of data quality with a specific focus on its suitability for beneficial purposes. The assessment encompasses three critical dimensions: Data Accuracy, Data Completeness, and Usability of Data. Ratings, represented by $\bar{x}$ (average), S.D. (standard deviation), and the Level of Satisfaction, were assigned on a scale from 1 to 5. The study culminates in an overall assessment that provides valuable insights into the quality and usability of the data for various purposes.

Data Accuracy: The research reveals an outstanding average rating ($\bar{x}$) of 4.68 for Data. Accuracy, coupled with a low standard deviation (S.D.) of 0.57. This indicates a remarkable consensus among evaluators, signifying that the data is exceptionally accurate, resulting in a "The Highest" level of satisfaction.

Data Completeness: In terms of Data Completeness, the data achieved a commendable average rating of 4.32, with a standard deviation of 0.72. While slightly lower than other criteria, the overall assessment still categorizes the data as "High" in terms of satisfaction.

Usability of Data for Beneficial Purposes: The research highlights the superior usability of the data, with an impressive average rating of 4.73 and a standard deviation of 0.63. Evaluator consensus designates this aspect as achieving "The Highest" level of satisfaction, emphasizing its effectiveness for various beneficial purposes.

Overall Average Evaluation Result: Combining evaluations across all criteria, the data obtained an impressive overall average rating ($\bar{x}$) of 4.58, with a standard deviation of 0.64. This indicates a high level of consistency in evaluator opinions, resulting in an overall assessment at "The Highest" level of satisfaction.

This research provided a comprehensive understanding of the quality and usability of data for beneficial purposes. The consistently high ratings in accuracy, completeness, and usability underscore the reliability and effectiveness of the data, offering valuable insights for stakeholders seeking to leverage data for informed decision-making and strategic planning.

Title for evaluation	$\bar{x}$	S.D.	Level of Satisfaction
2. Report System			
1. User Friendly	4.41	0.67	High
2. Appropriate Reporting of Results	4.50	0.67	The Highest
Overall Average Evaluation Result	**4.45**	**0.67**	**High**

Table 5: The Result Assess User Satisfaction with the System of Report System (N=22)

Table 5 show the result of Assess User Satisfaction with the System of Report System, this research investigates user satisfaction with a Report System through a meticulous evaluation involving a sample group of 22 participants. The study focuses on two critical dimensions: User-Friendliness and the Appropriate Reporting of Results. Ratings, represented by $\bar{x}$ (average), S.D. (standard deviation), and the Level of Satisfaction, were assigned on a scale from 1 to 5. The findings provide insights into the perceived usability and effectiveness of the system.

User-Friendly: The participants' average rating ($\bar{x}$) for User-Friendliness was 4.41, with a standard deviation (S.D.) of 0.67. This indicates a high level of satisfaction, categorizing the system as "High" in terms of user-friendliness.

Appropriate Reporting of Results: For the Appropriate Reporting of Results, the average rating was 4.50, with a standard deviation of 0.67. Evaluator consensus designates this aspect as achieving "The Highest" level of satisfaction, emphasizing the system's excellence in reporting results.

Overall Average Evaluation Result: Combining evaluations across both criteria, the system obtained an overall average rating ($\bar{x}$) of 4.45, with a standard deviation of 0.67. This indicates a consistent level of satisfaction among users, resulting in an overall assessment at the "High" level.

This research provides a comprehensive understanding of user satisfaction with the Report System, emphasizing its high level of user-friendliness and excellence in reporting results. The consistently positive ratings from the sample group underscore the system's effectiveness and usability, offering valuable insights for system developers and stakeholders. These findings contribute to informed decision-making for further system enhancements and improvements.

Conclusion

In summary, the study examined the possible advantages and consequences of putting the suggested information system into practice within the framework of the Faculty of Industrial Education and Technology (FIET). According to the results, the implementation of this information system has the potential to displace conventional report formats and bring about a more simplified and effective method of data administration.

The technology was ready to give FIET executives the power to strategically create courses that exactly match the changing demands of students. Decision-makers can obtain important insights into the curriculum design process by utilizing the information system's capabilities, which promotes flexibility and responsiveness to new developments in education.

Additionally, the information system proved to be very helpful for data-driven planning related to student applications for bachelor's degree programmed in the upcoming academic year. Its capacity to harness and analyze data provides a strategic advantage in tailoring application channels to align with the evolving preferences and requirements of prospective students.

The information system's incorporation of cloud computing technologies guarantees simple accessibility, improving stakeholders' overall user experience. This feature makes it easier to

obtain important information, which boosts productivity and creates an atmosphere that is easy to utilize.

In conclusion, the suggested information system offers a complete solution that, in addition to taking the place of conventional reporting techniques, empowers decision-makers, makes strategic curriculum creation easier, helps with student application preparation, and guarantees accessibility via cloud computing. The present study established the foundation for the implementation of the information system in FIET by providing a proactive method for managing data and making strategic choices in the academic setting.

Suggestions

It became clear from the creation of Informative Reports for the Analysis of Student Admission that the information provided by the present data reporting was insufficient to analyze students' growth during the course. As a result, data collecting will be improved in the future, beginning before students are admitted and continuing until their studies are finished. The goal of this thorough data gathering is to make analysis easier to plan and create future course enhancements.

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Literature Review of Teachers' Perspective of Blended Learning Model in Secondary and Higher Institutions

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Abstract

The objective of this paper is to provide an extensive literature review of academic papers written in English about teachers' perspective of Blended learning model in secondary and higher-level educational institutions. The research shows us, that there are many factors that influence how the implementation of the Blended learning model is accepted by different educational institutions and in many cases, it comes right down to culture. This is also the reason why, the implementation tactics and acceptance can't just be copied from one country to another, or from one culture to another, so the approach changes each time. There are differences between implementing the model into different levels of education, for example secondary education or higher education and there are also differences between the perceived perspective of Blended learning model on each educational level. The results show us that a lot of the research done in this area has been connected with students' satisfaction, These results imply that more research needs to be done from teachers' perspective. Blended learning is definitely staying here for good and is has brought a lot of success to education but we can also see that more work and research needs to be done to achieve a quality education and satisfaction on all sides.

Keywords: Blended Learning, Teachers' Perspective, Review, Secondary and Higher Institutions

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Introduction

Blended learning has been around for decades, the term was first used in 1999, when the American Interactive Learning Center began to launch software programs designed for teaching over the Internet. Unlike many other pedagogical technologies, Blended learning has no specific authorship and has evolved in many ways spontaneously, as a result of numerous attempts to change existing teaching methods and principles. The spontaneous and multifaceted evolution of Blended learning presents challenges when attempting to analyze this technology, beginning with the formulation of a clear definition. Blended learning is a learning system based on a combination of face-to-face learning and computer aided learning (Fedorova, 2020). But even though the Blended learning has quite a rich history, there are still many challenges affiliated with it and are affecting the adoption of this model fully. Some challenges are connected to teachers' and students' attitudes, some challenges are cultural, some challenges arise from technology issues. This literature review research will focus on Teachers' perspectives using Blended learning model in higher and secondary education.

Terminology

The term Blended learning is, as Hrastinski (2019) points out, identified as a broad term, encompassing a range of combinations that involve merging different instructional methods, pedagogical approaches, and technologies. These blends, however, may not align with established definitions of Blended Learning. Online learning, on the other hand, refers to electronically delivered instruction through various multimedia, Internet platforms, and applications. This term is often used interchangeably with others such as web-based learning, e-learning, computer-assisted instruction, and Internet-based learning (Maddison et al., 2017). There are also authors that believe Blended learning needs a wider definition, to better describe its purpose, including Cronje C Johannes (2020) who proposed Blended learning could be defined as appropriate use of a mix of theories, methods and technologies to optimize learning in a given context. Blended learning can also be characterized as the creation of learning experiences that utilize a blend of face-to-face, remote, or online delivery methods, learning technologies, multimedia for delivery, and pedagogical methodologies. This approach aims to achieve a diverse set of learning outcomes within educational or training settings (Leal Filho Editor, n.d.).

Blended Learning in Higher and Secondary Education

There are different reasons for growing varieties of education, one of them, as Bates (2022) points out, is students' diversity, from full-time campus-based learners to lifelong learners already and to address the educational needs of individuals who haven't succeeded in the conventional school system and are seeking second-chance opportunities, especially those with advanced post-secondary education, the use of new information technologies is essential. This demand for flexibility has led to the adoption of a wider range of delivery modes, including campus-based teaching, Blended or hybrid learning, and fully online courses and programs. These varied approaches are applicable in both formal and non-formal educational settings, offering the flexibility for learning to occur at any time and any place. Tonbuloğlu & Tonbuloğlu (2023) have observed Blended learning practices have experienced increased traction in recent years, particularly during the pandemic. Despite the challenging circumstances, these practices have not only retained their prevalence but have also underscored their significance in education by leveraging technological capabilities. Studies

like this led us to believe that there are many obstacles while adopting new learning approaches, from teachers, to students, to technology, culture but nonetheless new education trends seem to be going in the direction of combined face-to-face and online learning. Blended learning has slowly found its way into all levels of education and is becoming a part of everyday learning. The gradual increase in the number of higher education students opting for the Blended option is an indicator that the preference of one learning model of learning over the other might be determined by multiple factors, including level and lifestyle. Educational institutions have responded to Blended learning differently. It has become the most revolutionary trend in higher learning institutions. Researchers have found that motivation, course design, and communication are the key determinants of the success of Blended education in higher learning institutions (Baquero & Escortell, 2022). Blended learning emerges as a precursor to substantial changes in higher education and is expected to wield a similar impact in K-12 schooling and industrial training. The flexibility inherent in Blended learning allows for the optimization of various positive educational functions (Dziuban et al., 2018). The prevalence of Blended learning models in K–12 classrooms is swiftly growing, marking a significant cultural shift in the realms of teaching and learning (Schechter et al., 2017). There are of course challenges that come with online education, like teacher's skills, competencies and attitude. This has been approached in many studies, Ye et al. (2022) studied Chinese English teachers and found that teacher's attitude toward Blended learning, can directly influence teachers' use of Blended learning. In 2017 Schechter et al. (2017) did a study that showed significant improvements in reading skills during the analyzed period for the students of the engaged teachers. The utilization of distance and online learning in the K-12 education sector is experiencing significant and rapid growth. However, the literature – and, in particular, the research – to support the effective design, delivery and support of K-12 distance and online learning has not kept pace (Barbour, 2019). An examination and analysis were conducted on the application effectiveness of both traditional teaching methods and Blended teaching methods, considering student learning behavior and outcomes. The findings revealed that, in comparison to the traditional teaching mode, the Blended teaching mode enhances students' engagement in learning, leading to improved teaching effectiveness. This approach proves beneficial for students in enhancing their knowledge and overall competency (Liu, 2021).

Teachers' Perspective

Blended learning is a fairly new concept to the educational world, where a number of institutes are now implementing it. Understanding the way, in which teachers and students view the concept of Blended learning (BL) is the first step towards attaining success. Particularly, assessing the attitudes of learners toward Blended Learning (BL) allows for the identification of current opportunities and potential obstacles. Simultaneously, understanding the teachers' perspectives on the strategy aids in designing a Blended Learning-based approach. (*Blended Learning: Teachers and Students Perspectives | Free Essay Sample*, n.d.). In a study performed by Sorbie (n.d.), teachers' perceptions of Blended learning varied and included the value of such for individualization of student learning, enhancement of organization, increased engagement, communication, and collaboration. In addition, teachers thought Blended learning allowed students to self-regulate in a student-centered environment while offering real-world relevance. Saeed (2020) has also found a positive response to Blended learning environment from teachers', describing the results of his study by saying that, if teachers are provided with the right type of trainings and peer coaching from experts, they will be able to meet the needs of students and will be encouraged to create a Blended learning classroom. With the right type of support and time, knowledge and understanding of

Blended learning will become an asset for schools throughout the world. Different secondary education researchers, like Arokia Maria Josephine Marie S. & Sreekala Edannur (n.d.), Raymond (n.d.) and Yarborough, 2021 (n.d.) point out, there is a lack of knowledge as to what extent a high school teacher's perspective of Blended learning influences his or her implementation decisions and how teacher perspective and lack of training are critical factors contributing to teachers' reluctance in terms of technology-integrated Blended learning. The findings are similar in higher education, where one of the researchers found that extensive research has identified barriers to the adoption of technology, covering various aspects. These obstacles include issues like the information technology (IT) proficiency of faculty members, organizational climate, resistance to change, limited institutional and financial support, and time constraints. These barriers are typically categorized as first-order and second-order. First-order barriers are linked to external factors such as time, resources, and organizational culture, while second-order barriers are connected to teachers' pedagogical beliefs. Furthermore, a third-order barrier exists, which relates to teachers' ability to design learning experiences that consider the context and needs of the learners (Rizvi et al., 2017). Another author discovered that because, all of the prospective teachers find the undergraduate education they have received is insufficient in terms of gaining knowledge, skills and practices related to Blended learning. The insufficient knowledge, skills and practices related to Blended learning in undergraduate education cause prospective teachers to have difficulty in establishing a connection between social studies education and Blended learning (Bursa, n.d.). In a study on online learning during pandemic, the authors suggested Many teachers who took part in the study initially held a negative perception of online learning and felt apprehensive about adopting it due to their limited ICT skills and pedagogical knowledge. However, the transformative impact of the pandemic on education compelled them to shift their teaching approach to include online learning. Despite the considerable challenges, participants acknowledged that online learning offered advantages to both teachers and students, particularly in terms of time management, resource utilization, and opportunities for lifelong learning (Tsegay et al., 2022). The future of Blended learning primarily relies on how much the challenges teachers have faced over the years are addressed.

Cultural Influence on Blended Learning

Culture is a critical component of any learning environment. Recognizing the impact of culture within a specific learning context is crucial. Efforts should be made to shape that culture towards supporting the desired learning environment believed to be most effective. However, changing a pre-existing, dominant culture is very difficult. Nevertheless, new technologies enable new learning environments to be developed, and thus provide an opportunity to develop the kind of culture within that learning environment that will best serve your learners (Bates, 2022). The cultural values of a country play a significant role in shaping its national psychology and identity (L. Zhang, 2013). Parents often, based on their own believes, influence and decide their children's educational platform. In many cases, parents choose schools for their children based on shared values and beliefs. Consequently, the characteristics of learners within a school are often shaped by both the cultural influence of their parents and the prevailing culture within the educational institution. This is one of the many ways that culture can be self-reinforcing (Bates, 2022). Despite the challenges, certain educators are firm in their belief that the adoption of Blended education should not be overlooked, especially in the face of societal changes and other influencing factors. Its adoption should not over-emphasize the challenges but also the opportunities for learners, educators, and all stakeholders (Baquero & Escortell, 2022). Alsaif Mohammed (2021) noted that certainly, cultural attributes play a crucial role in shaping online presence and influencing

learners' perceptions of computer-based learning. Understanding how individuals from diverse cultural backgrounds respond to online learning necessitates careful consideration of their cultural contexts. The impact of culture on learner behavior and their acceptance of the learning environment becomes particularly pronounced in the educational context, especially when integrating tools and functions tailored to varied learning levels and aligned with cultural preferences. When teachers assume the role of implementing externally initiated educational innovations or new pedagogical approaches, they may either resist or adapt to the innovation, considering the prevailing norms of practice or their perceived preferred practices (Lee, 2019). Culture is strong force and has the power to influence the acceptance of change, it takes time to overcome challenges and adapt to changes, while implementing innovation.

Summary of the Literature and Key Findings by Relevant Authors

A review of previous research relevant to this study can provide a base for comprehension how teachers perspectives may affect the quality and outcomes of a Blended language learning environment. There are many ways to look and compare the Blended learning model implementation into the educational system. We can compare pre and post pandemic implementation and we will see that during pandemic and post pandemic era has increased the implementation because there simply was no other way to educate people, so the educational institutions were in way forced to do so. We can also compare secondary and higher education implementation and see if there were any differences. And last but not least we can also compare the implementation success between teachers' and students' perspective. This paper will focus on higher and secondary education institution and teachers' perspectives of Blended learning model. The below literature summarization includes some of what has been researched in this area so far and the results of the studies. The reason for including students' perspective is to show how much research has been done from students' perspective especially compared to teachers' perspective.

Author	Research focus	Educational stage	Key findings
(Almaiah et al., 2020)	Students	Higher education	The findings revealed three primary challenges hindering the utilization of the e-learning system, specifically, (1) issues related to change management, (2) technical challenges associated with the e-learning system, and (3) difficulties related to financial support.
(Basar et al., 2021)	Students	Secondary education	Even though online learning has demonstrated its ability to support students' well-being during the pandemic, it is deemed less effective compared to traditional in-person learning. Moreover, the absence of a resilient online infrastructure can hinder the efficacy of online learning. To enhance students' online learning experiences, teachers need to employ effective pedagogical methods.
(Bhadri & Patil, 2022)	Students	Higher education	Feedback results indicate that the Blended learning approach is characterized by greater flexibility and offers independent learning opportunities for students.

(Chakraborty, 2017)	Students	Higher education	The study's conclusion was that the majority of lecturers responded positively by adjusting to the transition from offline to online learning, and the implementation of online learning has been successful. Three crucial areas identified as significant in the online learning environment are learners' attitude, motivation, and learning. Teachers can acquire knowledge about various aspects of Blended learning by participating in sessions and networking. This, in turn, will offer a broader range of options for student learning within Blended learning models.
(Danchikov et al., 2021)	Students	Higher education	In managing the online learning process, additional skills such as experience in virtual classrooms, patience, empathy, a caring attitude toward students, exceptional presentation skills tailored to specific topics, adept handling of learning tools, accessibility, and proficiency in using convenient functions were deemed essential.
(Evans et al., 2020)	Teachers	Higher education	Professional development, teachers remain critical to learning.
(Han & Luo, 2021)	Teachers and students General	Higher education	The anticipated result of constructing the hybrid teaching model, encompassing both online and offline components, is not only to fulfill the learning requirements of on-campus students but also to offer high-quality teaching resources and conditions for a broader audience of social learners.
(Hussein Sami et al., 2021)	Students	Higher education	The results suggested that a substantial majority of the participants hold a negative stance toward online education. Similarly, respondents expressed a preference for and deemed on-campus education more effective.
(Jacob et al., n.d.)	Teachers and students	Higher education	Students also expressed a positive inclination towards learning in the Blended Learning (BL) environment, indicating a preference for it over more traditional classes. Notably, teacher practice and behavior were found to have minimal impact on student perceptions of the BL environment, although certain findings suggested that teacher experience might serve as a predictor of student satisfaction with their instructors. The study's results offer valuable and detailed insights into the varied experiences of teachers and students in the context of teaching and learning within a Blended learning model.

(Jiang et al., 2023)	General		Stakeholder perspectives on online education have evolved alongside the widespread adoption of the "technical revolution" and the concept of "lifelong learning" in China. The understanding of online education continues to deepen, fostering a collective appreciation of its value and practical application. This study identifies the inception of China's online education policy, categorizes its development into four stages, and comprehensively compares significant projects in both K–12 and higher education. In China, the integration of individual online learning into large-scale education initiatives reflects a commitment to realizing the vision of lifelong learning.
(Kavitha & Jaisingh, 2018)	Students	Higher education	The success of Blended learning hinges on several factors, including the quality of course materials, the mindset and learning ability of students in interactive environments, and the user-friendliness of tools and the learning environment. Additionally, Blended learning is significantly influenced by a student's attitude towards a given task. The results suggest that the Blended learning approach tends to be more advantageous for students who possess skills in utilizing specific computer programs and applications.
(Kintu et al., 2017)	Students	Higher education	The findings suggest that certain student characteristics and backgrounds, as well as design features, serve as significant predictors for student learning outcomes in Blended learning.
(Koneru, 2019)	Teachers	Higher education	Blended learning instructors found that designing and delivering Blended courses benefitted them in several ways, including: (i) planning and integrating both offline and online assessments and activities, (ii) enriching students' learning experiences with multimedia resources, such as open educational resources (OER); (iii) adopting flexible and innovative instructional practices; (iv) improving communication and interaction with students; and (v) enhancing digital literacy.
(Le & Pham, 2021)	Teachers	Higher education	In summary, Vietnamese pre-service teachers responded positively to and expressed a preference for the utilization of Blended learning in their training programs.
(Liu, 2021)	Students	Higher education	The implementation of the Blended teaching mode has been observed to enhance students' engagement in learning and contribute to an improvement in the overall teaching effectiveness.

(Lubis et al., 2022)	Students	Secondary education	With the establishment of the structural model to gauge user satisfaction in using Blended Learning Systems (BLS), several considerations should be taken into account for model enhancement. These include evaluating the indicators used, refining the sampling technique, enhancing the reflective model, and understanding respondents' willingness to answer. In conclusion, the study indicates that Information Timeliness has a negative impact on Overall Satisfaction. In contrast, variables like User Support, Perceived Utility, Software Adequacy, Computer Self-Efficacy, and Expectation of Quality have a positive influence on Overall Satisfaction.
(Meitreya et al., 2021)	Students	Higher education	Even all the research articles studied did not indicate that online education was better than offline learning. Neither study demonstrated that online learning was less effective than offline, irrespective of the statistical techniques used. We cannot yet imagine whether online learning works better than offline
(Minhas et al., 2021)	Teachers	Higher education	Positive perspectives among teachers also appear to enhance teacher efficacy, subsequently contributing to improvements in student confidence and the overall success of the Blended Learning (BL) initiative. This study reaffirms previous empirical findings emphasizing the significance of professional development in augmenting teacher efficacy.
(Muhammad et al., 2020)	Students	Secondary education	The overall expression of students was positive and perceived that teacher were consistent with good practices in the BL environment.
(Muxtorjonovna, 2020)	General Blended		Blended learning stands out as an effective teaching approach that offers flexibility and ease of access.
(Selim Shawky El-Sayed Tealib & Prof. Dr. Awatef Ali sheir, 2021)	Students	Secondary education	The findings of this research lead to the conclusion that the Blended learning model has a more substantial impact on students' achievements. There was a notable increase in student learning outcomes in information and communication technology subjects after the implementation of Blended learning.
(Sorbie, n.d.)	Teachers	Secondary education	Many of the teachers felt students could easily become disengaged from their learning due to things that do not pertain to the class like using their device to engage in gaming and social media.
(Suri, 2021)	General		Two-way communication is essential and that it is difficult to implement it in online classroom. The pandemic has presented the most significant disruption to education systems in history.

(Tayag, 2020)	Teachers and students	Higher education	While students recognize the advantages of utilizing Blended learning in their lessons, addressing the associated challenges is equally crucial for them to meet the teachers' requirements. On the other hand, teachers are seeking the provision of technical skills, training on new pedagogies, and sufficient preparation time to effectively develop lessons using a Blended learning approach model.
(Tealib Selim Shawky El-Sayed & Sheir Awatef Ali, 2021)	Students	Secondary education	In light of the research results, it can be deduced that the Blended learning model had a more significant contribution to students' achievements. As a recommendation, the study suggests the utilization of Blended learning to enhance students' academic performance.
(Tsegay et al., 2022)	Teachers	Higher education	This study brought attention to teachers' concerns, their perspectives on online learning, and the absence of adequate training in online teaching. Consistent with previous research, the study emphasized that a lack of technological knowledge among teachers constitutes a significant hurdle in the effective implementation of online learning. Many participants underscored their deficiencies in understanding and training related to online teaching and its delivery methods. These challenges seemed to impact teachers' perceptions of their competence and confidence in delivering high-quality online classes.
(W. Zhang & Han, 2012)	Students	Higher education	Upon analyzing and discussing the obtained statistics, the author concluded that, in comparison to the traditional teaching approach, participants exhibited more positive attitudes towards the Blended learning model. Additionally, participants expressed a preference for this new Blended learning model, noting that it could better stimulate their interest, promote autonomous learning and collaborative learning, and enhance their confidence.
(Yarborough, 2021)	Teachers		The findings indicate that teachers view Blended learning as both user-friendly and valuable. Additionally, teachers predominantly employ either the flipped classroom model or the face-to-face driver model for the implementation of Blended learning.
(Zhan et al., 2021)	General review		The quantity of online courses is substantial, though the quality varies; students are expected to possess increased learning autonomy and self-discipline.

The literature review shows that quite a lot of research has focused on students' perspective and experiences of Blende learning, with the biggest issues that students have being connected to their attitude towards learning, technological abilities, teaching methods used by

their teachers during Blended learning and self-discipline. Only a few works in literature demonstrate teachers' perspective towards Blended learning in secondary and higher education. And the research that has been done in this area suggests difficulties are connected to professional development, received training, technological training, preparation time given for the classes and attitude towards teaching in Blended learning environment. The previous studies reveal that the attitude and experiences that teachers have are often negative due the above-mentioned reason. Previous research can only be considered a first step towards a more profound understanding of teachers in general and their needs that will have to be understood and met in order to change the attitude and coincidentally the quality of Blended learning classes.

Conclusions

Above literature review has shown us that a lot of the research done in this area has been connected with students' satisfaction, I do see a lack of research done from teachers' perspective. Teachers play a pivotal role in interpreting innovative designs and translating them into educational practice. (Könings et al., 2007). The collaboration between teachers and learning designers is crucial to successfully implement a robust system using the Blended Learning approach for the future. Simultaneously, educational designers can enhance and create learning-friendly Blended Approaches, facilitating their practical application by students and teachers in the learning process. Bhadri & Patil (2022) say that The adoption of the Blended teaching mode represents an unavoidable trend in educational reform. Baquero & Escortell (2022) believe that the future of Blended learning primarily relies on how much the challenges teachers have faced over the years are addressed. Notwithstanding the challenges, certain teachers firmly believe that the adoption of Blended education should not be disregarded, especially as societal dynamics and other factors undergo change. Its adoption should not over-emphasize the challenges but also the opportunities for learners, educators, and all stakeholders. I do believe that more comprehensive research is needed in this area, as mentioned especially from teachers' perspective. The most formidable challenges associated with 'Blended' learning center around providing professional development opportunities for university teachers. This is particularly crucial as the role of the teacher remains critical to the learning process, whether influenced by or in conjunction with technology (Evans et al., 2020). Some teachers have failed to adapt their teaching ability to the needs of online education and have little motivation to continue engaging in online education (Jiang et al., 2023). It seems that teachers' perspective towards Blended learning really depends on their environment, organization, provided training, culture and consequently attitude. There are a few challenges along the way but with better organization of Blended learning this can be overcome. Further research on teachers' perspective on Blended learning is needed to better understand their experiences and support their needs in order to improve the attitude and perception towards Blended learning.

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Pedagogical Strategies for Reflection That Promote Student Growth

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Abstract

Institutions of higher education are the starting point for students in pursuing lifelong autonomous careers. To become autonomous learners, they must make independent choices and decisions about the content of and strategy for learning. In this regard, reflection is an essential component of quality learning and the expression of such learning. In addition, it forms part of learning in which learners seek to understand new knowledge and relate it to previous knowledge. Intentional reflection in learning influences one's involvement in the learning process, the interpretation of a task at hand, and strategies selected and adopted. This study analyzed a learning portfolio that continuously recorded the results of the reflection of students on their experiences, which was conducted in a leadership education program for first-year master's students in the Graduate School of Engineering and Science. Based on the results of this analysis, the study conducted interviews with students who demonstrated positive behavior changes. To elucidate the mechanism of behavior, change through reflection, the study focused on the type of semantic environment and factors involved in each other to produce behavior change. On the basis of the results of the quantitative and qualitative analyses and of the literature review on reflection, we propose educational strategies for reflection that promote student growth.

Keywords: Reflection, Leadership Education, E-portfolio

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Introduction

Society is rapidly changing with the advent of a volatile, uncertain, complex, and ambiguous world, the use of artificial intelligence (AI) due to the coronavirus pandemic, and the acceleration of digitalization. Students can look forward to a future in which they will continually adapt to new situations, inspire themselves, and carve out unique careers under uncertain and unpredictable circumstances. Universities must be places for the development of autonomous learners in which students are aware of their goals, proactively engage in learning, appropriately evaluate achievements, and move forward to further necessary learning.

Leadership, which is the core of this research, is a highly interdisciplinary theme examined in multiple fields such as engineering education, business administration, educational technology and psychology. At present, leadership research is being transformed from exploring the nature to developing leadership. Learning from experience is gaining attention as an excellent method for leaders to grow, and empirical research on leadership development through experience learning is progressing. Previous studies demonstrate the importance of reflection on experience (McCauley, 2013). Thus, the process of reflection is important for promoting effective reflection from experience.

The current study analyzed a learning portfolio that continuously recorded the results of the reflection of students on their experiences, which was conducted in a leadership education program for first-year master's students in the Graduate School of Engineering and Science. Based on the results of the analysis, we conducted interviews with students who demonstrated positive behavior change. To elucidate the mechanism of behavior change through reflection, we focused on which type of semantic environment and the factors involved in each other to produce behavior change. Using the results of quantitative and qualitative analyses and of a literature review on reflection, we propose educational strategies for reflection that promotes student growth.

1   Reflection and Metacognition

In the modern age, the social system of graduating from college, getting a job, and working at that company until retirement has come to an end. People are expected to develop their careers by utilizing their strengths and areas of expertise and updating their skills. Determining the skills you need requires the ability to reflect on and evaluate your own learning. Continuous self-improvement is based on the desire to grow and is accompanied by the feeling that one is making progress. Visualizing learning outcomes with the support of digital technology will encourage innovation in individual learning.

Metacognition is the perception of cognition from a bird's eye view, and the intentional reflection that learners engage in after an activity enhances metacognition (Moon, 2005). Metacognitive activity is also about thinking about one's own thinking, which is considered essential for effective learning and problem solving (Smith, 2004).

Opportunities to look at the self through others' perspective are important to enable learners to work at higher levels of metacognitive functioning. Mechanisms to enhance learners' metacognition can be intentionally incorporated into lesson design. Working with others is one such mechanism. Learners recognize differences in their own and others' thought

processes, cultural backgrounds, and working approaches. A new objective perspective is fostered by discussing how to collaborate successfully with others.

Advice from faculty members on the results of learners' learning is also an indispensable element. Visualization of learning results accumulated in the learning management system enables learners to analyze the data from an objective viewpoint and select their own learning strategies. However, in order to be able to do this independently, the scaffolding of the faculty members is necessary. The key is how faculty members can support the development of individual learners. This also requires the improvement of metacognitive functions that allow faculty members to objectively see how they themselves relate to learners.

2   Leadership Education Programme

2.1 Definition of Leadership

In this education, leadership is defined as a relational process of people attempting to accomplish change or make a difference to benefit the common good (Komives, 2013). In addition, leadership is not an ability bestowed upon a special person; instead, it is for everyone to exhibit and develop.

2.2 Leadership Education Model

The leadership education model (Fig. 1) presents five modules, namely, knowledge, training by simulation, real action, reflection, and assessment (Maruyama & Inoue, 2018). At the start of a program, a diagnostic evaluation is conducted. Next, a student enters a cycle of skill acquisition. The first step is for students to gain knowledge in the leadership arena through lectures. Then, they utilize simulation to experience leadership actions repeatedly. Simulation provides a safe environment in which they can attempt many approaches to leadership in various situations. A simulation exercise increases awareness of daily improvement and the necessity for new action as a result of self-reflection, all of which stem from various virtual experiences.

In the next step, students as a team utilize project-based learning (PBL), such that the abovementioned simulated experiences can help them exhibit leadership. Students can apply this leadership training to actual projects, which can increase their leadership skills. The application of conscious leadership to a project aimed at a specific goal in limited circumstances is highly effective.

The program repeats the above two steps in an upward spiral of leadership skills. Furthermore, learners reflect on the simulated experiences and action in practice and identify the skill correction component and the skill that requires training. In the end, students complete a comprehensive evaluation. This study focuses on the reflection component, specifically, individual reflection. An e-portfolio was used as a tool to promote reflection. Over a period of seven weeks, the students recorded and reflected on their leadership experiences in the e-portfolio on a weekly basis.
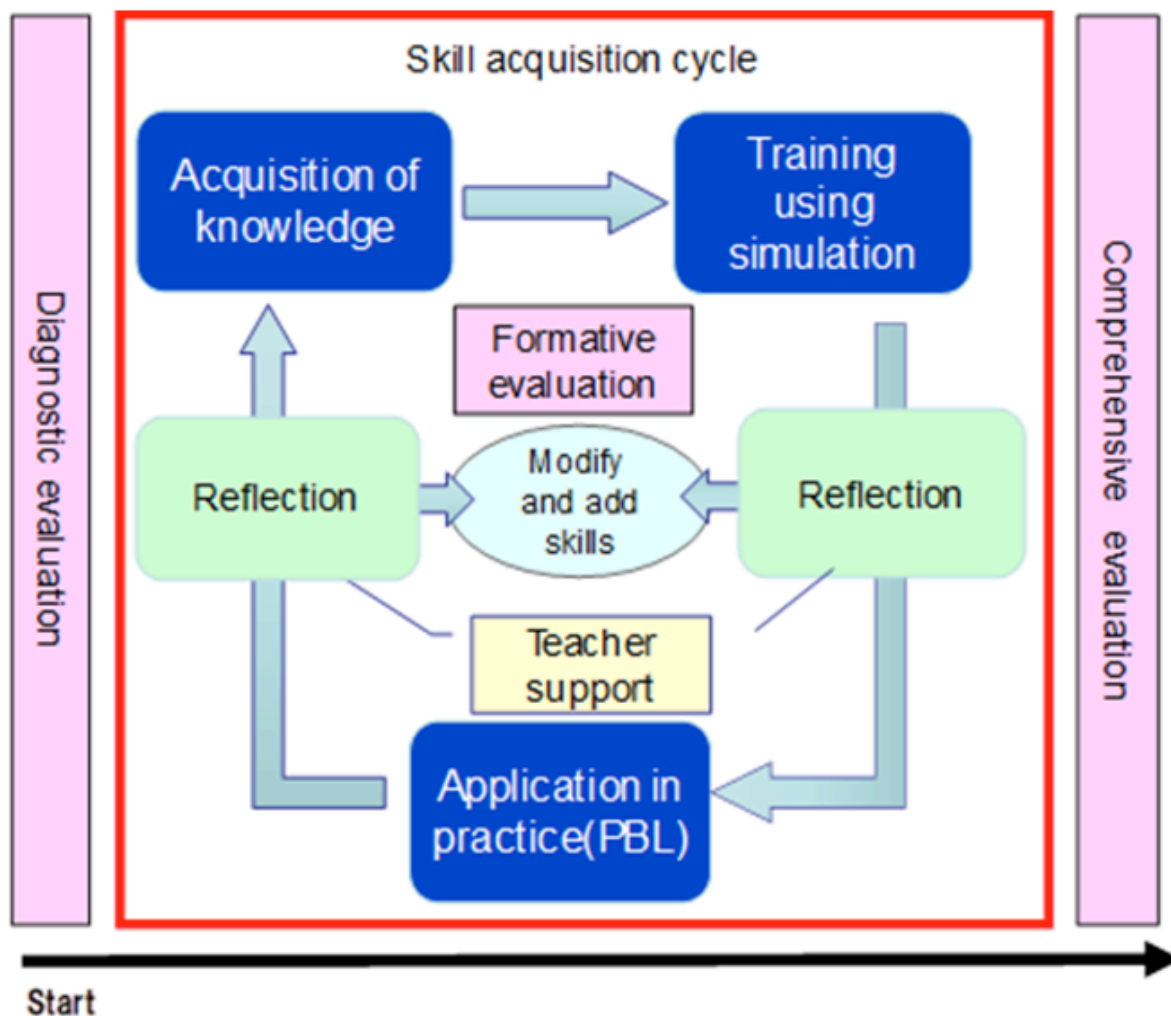
Figure 1: Leadership education model.

2.3 Education Using Simulation

Students who lack experience exhibit large gaps between knowledge and action, which makes immediately transforming knowledge into action impossible for them. Therefore, we utilize simulation as a means of bridging these gaps. The study developed a simulator with the goal of strengthening interpersonal skills and acquiring leadership skills to involve the members around them in achieving goals. Training using the simulator aims to ensure that repeated thoughts and actions are ingrained in the mind, such that they eventually and naturally surface without students being conscious of them as actual actions. The simulated experiences that students acquire through repetitive practice can provide a smooth bridge to reality.

2.4 E-portfolio Design

Table 1 presents the design of the e-portfolio. Students record and review their leadership experiences in the e-portfolio once per week for 7 weeks. For the reflection on leadership in PBL activities, the study uses five levels of prompts to promote deeper reflection.

#	Item	Questions that encourage reflection
1	Reflection of simulated experience	What did you learn from the simulated experience of the simulator? How do you use it in your PBL activities?
	Simulation score	What were the highest and lowest scores in the simulation practice?
2	Reflection of leadership in project-based learning (PBL) activities	1) What happened? (What needs improvement?)
		2) What were your feelings and thoughts at the time?
		3) Where do you think the cause of the failure was?
		4) What are the lessons learned from the experience?
		5) What action do you want to try next time for better results?
3	Evaluation of the frequency of leadership behavior by rubric	Choose your frequency of leadership behavior and enter the applicable number (1 = *always*, 2 = *often*, 3 = occasionally, and 4 less)

Table 1: E-portfolio design.

3   Methods

3.1   Survey Target

This study analyzed a learning portfolio in which the results of the reflection of students on their experiences were continuously recorded. The experiences were provided in a leadership education program for first-year master's students in the Graduate School of Engineering and Science. Afterward, interviews were conducted with five students who demonstrated positive behavior change. To elucidate the mechanism of behavior change through reflection, we focused on which type of semantic environment and factors were involved with one another to produce behavior change.

3.2   Survey Method and Contents

The survey was conducted in the form of semi-structured interviews that lasted for approximately 60 min per person. The survey was conducted in the following order: (1) explanation of the objective of the training and ethical considerations and signing of a research consent form and (2) the semi-structured interview. The main 10 questions of the interview were as follows:

- When were you conducting reflection?
- Where were you conducting the reflection?
- With whom were you reflecting?
- What did you reflect on?
- For what reason did you reflect?
- How did you reflect?
- Have you ever changed internally through reflection?
- Are there any behaviors that changed as a result of reflection?
- How did you use the results of peer reflection?
- What kind of support did you wish to receive from faculty?

Utterances during the interviews were recorded using a digital voice recorder with the approval of the research collaborators. Data analysis was conducted using the KJ method.

4   Results

The results of the analysis identified the following characteristics in the reflections of students with significant positive behavior change.

(1) They view the learning environment as a special opportunity instead of a norm, and they understand which aspect they need to focus on.

(2) They are objective about how reflection can lead to their behavior change.

(3) If they are going to spend time learning, then they want it to be meaningful. If they are going to reflect, then they want it to lead to my personal growth.

(4) They are evaluating their abilities and discovering the characteristics of their learning methods. They analyze which aspects are lacking and recognize the need for change.

(5) They are working on integrating the trajectory of their learning by revisiting the past and checking for changes in their learning.

(6) They recognize that learning outcomes are an individual responsibility.

5   Conclusion

The Graduate School of Engineering and Science has conducted leadership education for first-year students of its master's program. The simulator is used to improve the experience of students in a safe environment, because students have limited opportunities to learn leadership from hands-on experience. The program has five modules, namely, knowledge, training by simulation, real action, reflection, and assessment. The e-portfolio was introduced to invite students to review their behavior.

Thus far, through qualitative and quantitative research results (Inoue & Maruyama, 2016) (Maruyama & Inoue, 2019) (Maruyama & Inoue, 2020), we have identified positive changes in behavior through reflection. Furthermore, we conducted interviews with students with significant positive behavior change to determine the type of reflection they are implementing. By integrating the results of the analyses with those of previous qualitative and quantitative research, we propose some teaching strategies for reflection that promote positive behavior change.

(1) Understand the concepts and terminology of reflection. In other words, reflection literacy should be fostered.

(2) Continually record the results of reflection and visualize changes using e-portfolio and other tools.
(3) Recognize the transformation toward growth through personal reflection.

(4) Discover and utilize one's strengths from the record of reflection results.

(5) Identify events of one's growth.

(6) Discover the relationship of one's actions to the growth of others.

(7) Set life goals and reflect in light of these goals.

In the future, we intend to design a curriculum that introduces reflection that incorporates the abovementioned perspectives. To adjust one's learning, effectively conducting reflection is necessary. This ability is essential for becoming an autonomous learner throughout life.

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Using a Corpus-Based Approach to Explore Writing Variation in Engineering Subdisciplines: Pedagogical Implications

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Abstract

In the contemporary academic culture where publications are highly valued, engineering graduate research students are generally expected to publish their research outcomes during their doctoral candidature. Writing for publication can be challenging if one is not aware of the writing conventions in a subdiscipline. Furthermore, technical textbooks have been found to give contrasting and fragmentary advice regarding the use of passive voice to novice writers who intend to write in engineering subdisciplines. In response, some scholars have suggested engaging students with authentic language data relevant to the field, thus helping them better understand language conventions in their discipline. This study used *AntConc*, a corpus analysis tool, to explore writing variation on the use of the first-person pronoun with an active verb and the use of passive voice, as well as their rhetorical functions in journal abstracts, across eight engineering subdisciplines. A main corpus of 480 most-cited paper abstracts from 8 engineering subdisciplines was compiled and divided into 8 sub-corpora. Each sub-corpus consists of 60 abstracts from the top 5 journals in the field. *AntConc* was used to explore and analyse all the sub-corpora. The findings reveal significant variations across these engineering sub-disciplines in terms of usage frequency and rhetorical functions. To train engineering graduate research students in research writing, awareness in sub-disciplinary writing variation should be enhanced, and language analysis tools can be introduced for the students to further train themselves to be well-informed writers in their respective sub-disciplines.

Keywords: Graduate Research, Subdisciplinary Writing Variations, Engineering Subdisciplines, Corpus Analysis

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Introduction

In addition to faculty members, graduate research students are the main driving force of research at a university. Graduate research students work on innovative ideas under the guidance of their supervisors and further develop these ideas into research outcomes or industrial solutions. In the contemporary academic culture where publications are highly valued, graduate research students are generally expected to write for publication to communicate the outcomes of their research during their doctoral candidature. However, writing for publication can be challenging if the writer is not aware of the disciplinary writing conventions. One of the questions on writing convention that engineering graduate research students frequently ask is the use of active or passive voice in research writing. However, writing advice provided by technical communication text books to this question can be inconsistent and fragmentary (Conrad, 2018).

One way to deal with this issue is to provide students with more discipline-specific writing assistance (Boettger & Wulff, 2016). With this approach, understanding disciplinary writing variation has become increasingly important and relevant in instructional design and pedagogy (Boettger & Wulff, 2016; Cargill & Adams, n.d.). Moreover, engaging students with authentic language data is deemed a more practical means to help students understand the linguistic patterns used in their respective disciplines. In this regard, corpus-linguistic approaches have been seen as valuable tools to understand variation in technical and scientific writing for pedagogical purposes (Boettger & Wulff, 2016; Cargill & Adams, n.d.).

Many studies have been conducted to investigate various aspects of language use in a number of disciplines, such as reporting words in medical journals (Thomas & Hawes, 1994), personal pronouns in scientific journals (Kuo, 1999), the passive voice and reporting verbs in engineering (Boettger & Wulff, 2016), the use of the first-person pronouns in electrical engineering (Wang et al., 2021) and personal pronouns across soft and hard disciplines (Harwood, 2005; Hyland, 2003; Khedri, 2016). Most of the literature in this area has focused either on the analysis of linguistic features in one single discipline or on cross-disciplinary linguistic variations. Few studies have focused on variation of linguistic patterns across sub-disciplines within the engineering discipline.

This study aims to investigate language use in the abstract of eight engineering sub-disciplines, focusing on the use of active and passive voice, which has been an object of debate in engineering research writing for decades, and the use of first-person pronouns, particularly 'we', which has gained increasing attention in engineering research writing. The investigation aims to answer the following research questions:
- What is the extent and distribution of the use of passive voice in the abstract of engineering research articles across subdisciplines?
- What is the extent and distribution of the use of pronoun 'we' in the abstract of engineering research articles across subdisciplines?
- Does the extent and distribution of the passive voice vary across sub-disciplines in engineering?
- Does the extent and distribution of the pronoun 'we' vary across sub-disciplines in engineering?
- Is there any correlation between the use of passive verbs and that of the pronoun 'we' in general?
- What are the rhetorical functions of the 'we' pronoun in the abstract?

Such a study can further inform our understanding of sub-disciplinary variation. Its findings may be useful to graduate research students who would like to understand style and linguistic patterns in their respective fields for publication purposes.

Active Voice, Passive Voice and the First-Person Pronouns

The passive voice has been one of the most researched and debated clarity markers in scientific writing (Leong, 2020). For example, research writing style in the 17th century was characterised by the use of active voice; however, the style gradually shifted to being object-oriented after the industrial revolution (Ding, 2002; Leong, 2020). According to Ding (2002), "the passive voice in scientific discourse embodies the professional practices and rhetorical contexts of science…Scientists through employing passive voice in their writing tell scientific communities that what they present can be replicated and verified by the communities" (p.152). Passive construction has been deemed to have a place in engineering writing (Stewart, 1984), and its use has been thought to encourage precision and probity (Leather, 1996).

However, in recent years, there seems to be a paradigm shift which favours the use of active voice to improve clarity and conciseness (Foster, 2017). It has been found that many technical guides encourage users to avoid using the passive voice as it is deemed to be top-heavy, cumbersome and confusing (Banks, 2017; Wolfe, 2009). The use of passive voice is criticised for generating ambiguous sentences (Day, 2011). In addition, world leading publishers such as Nature and IEEE also encourage prospective writers to avoid using the passive voice. They advocate using the first-person pronoun 'we' as the subject in active construction. The influence of these journals could be far-reaching and have great impact on the various science and engineering communities. In fact, some diachronic studies on scientific writing has shown increasing use of the active voice at the expense of passive forms (Banks, 2017; Leong, 2020), and the use of active voice has been found to be related to the use of the first-person pronoun subjects.

> *The study found that the extent of passive use was stable from 1880 to 1980 (occurring in about 29–36% of all clauses) but declined in 2017 (averaging below 25%). The study also found a decline in the use of finite passives to describe methodological actions and a corresponding increase in the use of first-person pronouns in the 2017 articles.* (Leong, 2020, p.467)

In addition to addressing clarity issue, the use of first-person pronoun subjects together with active verbs is also associated with authorial stance (Hyland, 2003; Tarone et al., 1981). The use of 'we' as a subject in active construction is a rhetorical strategy (Harwood, 2005; Hyland, 2003; Tarone et al., 1981). Hyland (2003) has identified 4 rhetorical functions with self-mention through first person pronouns, some of which have also been identified by other researchers (Harwood, 2005; Tarone et al., 1998). The four rhetorical functions of self-mentions in research articles proposed by Hyland (2003) include: 1) stating a goal or outlining the structure of a paper, 2) explaining a procedure, 3) stating results or making a claim, and 4) elaborating an argument (p. 257). Harwood (2005) stresses that 'we' is used for self-promoting, with which the authors present unique or innovative methodological procedure, clarify their stance, and report or summarize findings. In a much earlier study, Tarone et al. (1981) also highlight that the first-person plural active is used by authors to contrast their work with those of other contemporary researchers. With reference to the above-mentioned, the rhetorical functions of the 'we' pronoun can be summarised as follows.

1. Stating the purpose or goal
2. Outlining the structure of a paper
3. Presenting one's stance or contrasting one's stance with others'
4. Elaborating an argument
5. Presenting unique research procedure or design
6. Presenting findings or contributions, or making a claim

However, not all publishers or authors of technical guides advocate active construction and the use of the first-person pronouns. The American Society of Civil Engineers, for example, stresses the importance of passive voice: "The passive voice is not intrinsically poor, despite what many writing textbooks and grammar-checkers tell us. We need the passive voice; it stops us from repeatedly having to use 'I' and 'we' or some other agent" (Silyn-Roberts Heather, 2004, p.198). Some researchers also argue that using the passive voice does not always lead to problems and its use is essential in some cases (Krisch & Houdek, 2015).

Because of the historical background and preferences of some journals, it is not hard to see why engineering researchers or technical communication scholars have very different or even contrasting views about the use of active and passive voice, and the use of first-person pronouns in research writing. In fact, some scholars have found advice and views on the use of passive voice in technical and scientific writing inconsistent and fragmentary (Boettger & Wulff, 2016; Conrad, 2018). This may have to do with the propositions of specific journals or sub-disciplines within engineering.

Unfortunately, this means that graduate research students can get conflicting information from engineering and technical communication text books (Wolfe, 2009) and blanket advocates of either the active or passive voice in research writing in different sub-disciplines. More empirical explorations about the use of active and passive voices especially in the engineering subdisciplines could inform the ongoing discussion. This paper contributes to the topic by investigating the use of passive construction, active construction with the 'we' pronoun, and the rhetorical functions of the 'we' pronoun in several sub-disciplines of engineering.

Description of the Self-Compiled Corpora and Analysis

Four hundred and eighty abstracts from the journals of 8 engineering sub-disciplines were collected and compiled to build a corpus. The corpus was divided into 8 sub-corpora, each with 60 most-cited or most popular abstracts from the top 5 journals in the field (Table 1).

The abstract is chosen for analysis in this study because it has been viewed as the most important part of a research article (Stojmenovic, 2010). In addition, Omidian et al. (2018) highlight that fundamental distinctions, in terms of linguistic features and rhetorical functions, among disciplines can be noticed through the analysis of abstracts.

Journal selection was based on the ranking of top journals in the respective sub-disciplines, according to *Google Scholar Metrics*. The papers were randomly selected from the most cited or popular categories in the last 1 to 3 years as listed by each journal.

Sub-corpus	Number of abstracts per sub-corpus	Number of words
1. Environmental and Geological Engineering	60	13956
2. Transportation	60	12529
3. Robotics	60	12038
4. Materials Engineering	60	11920
5. Fluid Mechanics	60	12695
6. Structural Engineering	60	12638
7. Electromagnetism	60	11036
8. Chemical Kinetics and Catalysis	60	11518

Table 1: Data description

Two linguistic features, i.e., the first-person pronoun 'we' and passive verbs, were investigated in all the sub-corpora. The 'we' pronoun was first searched in each sub-corpus and the number of hits was recorded. The number of sentences were also manually calculated to facilitate a comparison on the use of 'we' pronoun on per sentence basis.

To retrieve all instances of passives, any form of the verb BE (e.g., am, is, are, was, were, has been, have been, had been, will have been) was searched in *AntConc* (Anthony, 2005) and the resulting concordance was copied into a spreadsheet. The concordance lines were manually inspected to identify true hits of finite passive verbs, as shown below:
- Basic (be + past participle)
- Progressive (be + being + past participle)
- Perfective (have/has/had + been + past participle)
- Modal (modal + be + pp)
- Modal perfective (modal +have been+ past participle)

The number of passive verbs was calculated against the number of sentences.

Chi-square tests were conducted to investigate statistical significance of variation in terms of the use of the 'we' pronoun and passive voice across the 8 sub-disciplines, and Pearson correlation tests were conducted to see if there was any correlation between the use of the 'we' pronoun and passive verbs.

The most frequent verbs associated with the 'we' pronoun were also explored and analysed to discover their rhetorical functions.

Results and Discussion

Frequency of the 'We' Pronoun

Table 2 provides information on the use of the 'we' pronoun across all sub-disciplines.

Sub-discipline	Hits (occurrences)	Number of sentences	Number of 'we' at the sentence level (60 abstracts per sub-corpus)
Robotics	128	424	3.3
Fluid Mechanics	93	450	4.8
Transportation	77	485	6.3
Chemical Kinetics and Catalysis	40	306	7.7
Materials Engineering	29	419	14.4
Structural Engineering	31	475	15.3
Environmental and Geological Engineering	25	502	20.1
Electromagnetism	16	400	25

Table 2: The use of the first-person pronoun 'we'

Among all the abstracts, the 'we' pronoun appears the most frequently in Robotics (1 in every 3.3 sentences) and the least frequently in Electromagnetism (1 in every 25 sentences).

A chi-square test of independence was conducted to test the following hypotheses:
    H0: Abstracts in different sub-corpora do not differ in the use of the 'we' pronoun.
    H1: H0 is false.

The result – χ^2 (7, N=98330) = 205, $p < 0.00001$ – shows that there are statistically differences in the use of the 'we' pronoun in the abstracts of different fields.

To further verify the above results, the number of abstracts which contain the 'we' pronoun was also tabulated, as presented in Table 3.

Sub-discipline	Number of abstracts which contain at least one occurrence of 'we'	Number of abstracts which do not contain any 'we'	Number of abstracts in each sub-corpus
Robotics	49	11	60
Fluid Mechanics	35	25	60
Transportation	26	34	60
Chemical Kinetics and Catalysis	24	36	60
Materials Engineering	15	45	60
Environmental and Geological Engineering	13	47	60
Structural Engineering	9	51	60
Electromagnetism	8	52	60
Total	179	301	480

Table 3: The number of abstracts containing the 'we' pronoun

As shown in Table 3, the majority of the abstracts (301/480, 63%) do not contain any 'we' pronoun. The 'we' pronoun appears the most frequently in Robotics and the least frequently

in Electromagnetism. Forty-nine out of 60 abstracts (82%) contain the 'we' pronoun in Robotics but only 8 out of 60 (13%) in Electromagnetism do.

A chi-square test of independence – χ^2 (7, N=480) = 101, p < 0.00001 – confirmed that there are statistical differences in the use of the 'we' pronoun in the abstracts of different fields.

Frequency of the Use of Passive Verbs

The use of passive verbs was also explored across all sub-disciplines, and Table 4 details the results.

Sub-discipline	Hits (occurrences)	Number of sentences	Number of passive verbs at the sentence level (60 abstracts per sub-corpus)
Structural Engineering	350	475	1.4
Electromagnetism	226	400	1.8
Environmental and Geological Engineering	231	502	2.2
Chemical Kinetics and Catalysis	142	306	2.2
Materials Engineering	180	419	2.3
Robotics	150	424	2.8
Fluid Mechanics	157	450	2.9
Transportation	133	485	3.6

Table 4: The use of passive verbs across sub-disciplines

Passive verbs appear the most frequently in the abstracts of Structural Engineering (1 in every 1.4 sentences) while the least frequently in those of Transportation (1 in every 3.6 sentences).

A chi-square test of independence on a slightly modified form of the data shown in Table 4 (based on a coarse assumption of the number of sentences per hit) was conducted to test the following hypotheses:

   H0: Abstracts in different fields do not differ in the use of passive voice
   H1: H0 is false

The results – χ^2 (7, N=3461) = 232, p < 0.00001 – showed that there are statistically significant differences in the use of passive voice in the abstracts of different fields.

Correlation Between the Use of the 'We' Pronoun and Passive Verbs

A Pearson correlation test was conducted to explore if there was any correlation between the use of the 'we' pronoun and passive verbs. The results showed that there is a high negative correlation (-0.69) between the number of 'we' per sentence and the number of passive verbs per sentence. This shows that the sub-disciplines which use more 'we' also tend to use fewer passive verbs. This finding adds to the discussion that the use of 'we' may affect the use of passive voice in research writing (Banks, 2017; Leong, 2020).

Overall, the 'we' pronoun appears more frequently in the abstracts of subdisciplines such as Robotics, Fluid Mechanics and Transportation while less in those of Environmental and Geological Engineering, Structural Engineering, and Electromagnetism. It should be noted that most abstracts of the Robotics sub-corpus and of the Electromagnetism sub-corpus were extracted from IEEE journals (4 out of 5), respectively. In general, IEEE journals encourage the use of 'we' and active construction in research writing, and the findings for Electromagnetism seem at odd with this guideline.

Such variations could be due to the nature of the studies or sub-disciplinary conventions, which needs further investigation. For example, Bank (2017) mentions that authors tend to use the 'we' pronoun and active construction when expressing/demonstrating a mental process such as mathematical calculation. This study did not consider the research nature of the abstracts, which should be further investigated in future studies.

Linguistic Patterns in Writing the Research Aim

An analysis was also conducted to discover the linguistic patterns of the purpose/goal statements in the abstracts. Table 5 shows the results.

In terms of presenting the purpose/aim, 'This paper/article/study/work + active construction' is found to be the most frequently used across subdisciplines (35%), followed by the use of passive construction (31%) and 'We + active construction' (30.4%). This implies that the three patterns have their respective places in writing the research aim/purpose of engineering research articles. Compared with the other two, 'This paper/article/study/work + active construction', indicating a more neutral formulation (Foster, 2017), seems to be preferred by most engineering research writers across a few sub-disciplines in this study, particularly in Transportation and Environmental and Geological Engineering. The findings show that despite the encouragement to use active construction, passive construction is often used in writing the research aim, with about 1/3 of the abstracts across subdisciplines using passive construction to present the research aim/purpose. In Materials Engineering and Electromagnetism in particular, about half of the papers present the research aim/purpose in passive construction. As for 'We + active construction', it happens the most frequently in Robotics.

Subject of the sentence	Robotics	Structural Engineering	Chemical Kinetics and Catalysis	Fluid Mechanics	Electro-magnetism	Materials Engineering	Transportation	Environmental and Geological Engineering	Total occurrences (percentages)
We +active construction	42	10	21	27	7	13	19	7	146 (30.4%)
This paper/article/work/ study + active construction	15	25	11	13	22	16	35	31	168 (35.0%)
The aim/objective/purpose of this study		1		1			1	4	7 (1.5%)

Noun+ passive construction	3	23	26	15	31	30	4	17	149 (31.0%)
The authors+ active construction						1			1 (0.2%)
No clear purpose statement		1	2	4			1	1	9 (1.9%)
Number of abstracts	60	60	60	60	60	60	60	60	480 (100%)

Table 5: Linguistic patterns of the purpose/goal statements

'We' Collocation and Rhetorical Functions

An analysis was also conducted to explore what verbs collocated with the 'we' pronoun and what rhetorical functions they served. Frequently seen clusters (i.e., 3 occurrences and above) of the 'we' pronoun and corresponding verb, and their rhetorical functions are listed in Table 6.

We-verb collocation	Frequency	Rhetorical functions
1. We present	36	Purpose; contribution
2. We propose	35	Purpose; procedure; claim
3. We show	25	Purpose; contribution; claim; stance
4. We demonstrate	20	Purpose; procedure; claim
5. We review	14	Purpose; procedure
6. We discuss	13	Procedure; stance
7. We highlight	10	Purpose; stance; claim
8. We study	10	Purpose; procedure
9. We provide	10	Purpose; contribution; procedure
10. We use	10	Procedure
11. We report	9	Purpose; procedure; contribution
12. We identify	9	Procedure; stance; claim
13. We introduce	8	Purpose; procedure; contribution
14. We address	8	Procedure; claim
15. We find	7	Stance; procedure; contribution;
16. We perform	6	Procedure
17. We investigate	6	Purpose; Procedure
18. We examine	5	Purpose; Procedure
19. We hope	4	Stance; claim
20. We observe	4	Procedure
21. We conclude	4	Claim; stance
22. We derive	4	Procedure
23. We conduct	3	Purpose; procedure
24. We leverage	3	Procedure
25. We refer to	3	Procedure
26. We implement	3	Procedure

Table 6: We-verb collocation and rhetorical functions

The clusters in the table above show the various rhetorical functions of the 'we' pronoun collocating with different active verbs. Frequently seen rhetorical functions are presenting the

research procedure, stating the research purpose, presenting one's stance, and highlighting one's claim or contribution, which align with the findings of previous studies.

Conclusion

This paper seeks to explore whether there is any variation in terms of the use of the 'we' pronoun and passive construction in the abstracts across eight engineering subdisciplines, and it was found that the variation is statistically significant. Writers in certain subdisciplines, such as Robotics and Fluid Mechanics, tend to use the 'we' pronoun more often in their sentences as compared to writers in subdisciplines such as Electromagnetism and Environmental and Geological Engineering.

On the other hand, passive verbs appear more frequently in subdisciplines such as Structural Engineering and Electromagnetism, showing that the passive voice does have a place in engineering research writing. It may not be too practical to advise engineering researchers, especially graduate researchers, to avoid the passive voice in their writing as such blanket advice may not suit engineering research writers of different sub-disciplines.

Overall, there is also a negative correlation between the use of 'we' as the subject of active construction and the use of the passive voice, which means that if 'we + active construction' is more frequently used, there will be less passive construction in the abstracts.

In addition, the rhetorical functions of the 'we' pronoun with the corresponding verbs found in this study also align with those of previous studies whereby the use of the 'we' pronoun serves as a promoting strategy to state the research purpose, present authorial stance, describe the research procedure, make a claim or highlight contributions.

One pedagogical approach to equip engineering graduate researchers with knowledge about the writing conventions in their respective research fields is to introduce the concordance tool so that they can explore linguistic patterns in their specific discipline while writing for publication.

As the corpus size in this study is small, the findings should be seen with this caveat in mind. Nevertheless, they do provide a glimpse of language variations in engineering subdisciplines, perhaps showing that academic writing instructors should avoid giving blanket advice when it comes to writing for publication across sub-disciplines. For future studies, the relation between the nature of the study and the use of the 'we' pronoun should also be considered and further researched.

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Factors Affecting to Skill Training in Trimming Process

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Abstract
This research aims to study of factors influencing trimming skill in pineapples productivity which will lead to an increase in productivity in operations. The results showed that employees' skill is low with an average of 3 - 4 pieces per minute and the average waste was 2.5%. The group population is selected sampling group of employees 41 people with a duration of 5 months period, using the technique of providing feedforward feedback and peer learning techniques (Peer-Assisted Learning). The study found that male employees were more productive than female employees with an average productivity of 10.33 pieces per minute. Part-time employees were more productive than Permanent employees with an average productivity of 9.29 pieces per minute. The age range suitable for work was in the range of 21 - 30 years with an average productivity of 8.28 pieces per minute. In addition, it was found that the employee that has work experience period in between 1 - 5 years is the most effective. They have the highest productivity with an average of 8.27 pieces per minute. The training by using the technique giving information before practice and feedback (Feedforward and Feedback) with peer learning techniques (Peer-Assisted Learning) found that the pineapple trimming skill increased by 39% compared to the pre-training data collection, and reduce the defects caused by the pineapple processing process by 60%.

Keywords: Trimming Skill Training, Productivity, Training

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Introduction

The food industry is an industry that is very important to the country's economic system. In terms of production value, employment, and exports, Thailand's food industry is an industry. There is a high potential for production for domestic consumption and export. Because Thailand has a stable and prosperous agricultural production basis, quality produce is an important key. In addition, employee motivation also affects production efficiency and organizational development to improve in a way. A processed fruit production company is a company that engages in the production and export of canned fruits and fruit juices. It uses relatively high levels of labor. The company therefore wants to improve work methods in some areas to increase productivity and operational skills. From the training of employees' skills Must focus on work processes and operators. Similarly, Kritsada Chianwattanasuk [1] studied the motivation that affects employee performance, a case study of Ajinomoto Company. Betagro Specialty Foods Co., Ltd., found that personal factors in terms of gender, education, age, and different experiences will have different effects on work performance in terms of time, quality, and quantity of work. including relationships with supervisors will affect work to increase employee skills and lead to better productivity. The researcher conducted a research study for example Akaradet Maichan [2] studied the factors that affect the work efficiency of employees in the production line machinery installation industry in Songkhla Province. It was found that the work progress and stability in old age, including the environment in workplace. In additional Mubashar Farooq [3] has conducted a study on the impact of training and providing information before practice and feedback to the performance of employees. It was found that providing information before practice and providing feedback resulted in improved employee performance, like Chotima Nooprik [4]. Providing information before practice and feedback to further student learning was found which students were more efficient. Saisuda Pantrakul [5] analyzed the concept of peer-to-peer learning with hearing-impaired learners and normal learners and found that students improved. The research indicates that investments in training employees in quality control, safety, material requirements planning, and soft skills are worthwhile. As a result, organizations benefit from knowledge-driven revenue cycles, innovation, and creativity. Therefore, the technique of giving information before practice and feedback (Feedforward and Feedback) and the technique of peer-to-peer learning were chosen. (Peer-Assisted Learning) to be applied to employees in the production line and develop employee skills for better performance and for employees to help each other. In addition, it is a guideline for solving problems and improving the factory for use in developing production lines in the future. The feed forward and feedback training was able to helps in reducing the number of people in operations and increasing skills in operations. This leads to a reduction in waste and helps to increase quality output, low cost, and creates additional income.[6] It gives confidence to customers and creates stability for the company. It also directly affects the increase in productivity.

Methodology

The researcher observed and followed up on the evaluation of a specific sample group. The sample group must be willing to test and ready to develop themselves. They are selected as follows: 10 people worked on the production line in the pineapple eye cutting section, which consisted of one rack, Size 70, 80, 83. They have passed the preliminary test that there is an understanding of eye pecking and are ready to cooperate in collecting results to find trimming skill training for employees to increase productivity (Figure 1 and 2).
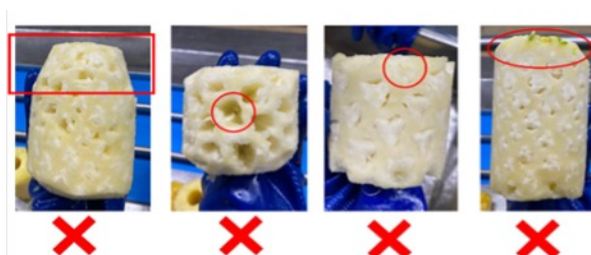
Figure 1: Example of defective pineapple

Figure 2: Example of processed pineapple

The feed forward is the provision of context for what one wants to communicate prior to that communication. In activity, feedforward creates expectations for the sample group. When an expected experience occurs, this provides confirmatory feedback. People with a peer supporter can share knowledge and experiences during training by being deployed to teach and staying close to people who work in the pineapple trimming process.

Collecting the Data of Staff's Performance

Collect the variable data that impacts on the staff's capacity as followed: Julalak Paka et. al. [6].

"Capacity" means the amount of product that can produce by using measurement unit as piece per hour and transform to piece per minute for plotting the graphs.

"Defect" means the waste of pineapple flesh (pineapple shreds) from peel and tweak the eyes process which is calculated in percentage from the formula as shown below and the result is in percentage of raw material defect.

Equations

Equations to Find the Defect Result in the workpiece that the sample recorded (1).

$$D = \frac{x - \left(x \times \frac{w}{t}\right)}{f} \qquad (1)$$

Explanation

D = Defect value (Percentage)
x = Weight of pineapple shreds from peel and tweak the eyes process (Kilograms)
w = Count of pineapple that is defected (piece)
t = Total pineapple that comes in the process (piece)
f = Count of good pineapple after process (piece)

Training Station Layout

The pineapple peel slides down the conveyor belt. The crew will then cut the pineapple afterwards. The staff will remove the remaining of the pineapple's green skin, prick out the eye, clean it, and then release it onto the belt as shown in the Figure 3.
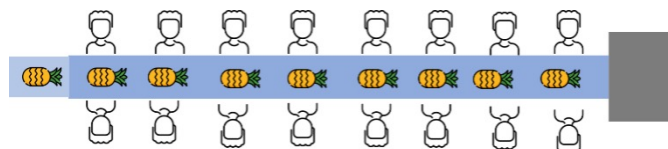
Figure 3: Schematic diagram of the process of chain pecking pineapple eye

Results

Productivity of pineapple trimming production line size 70, Employees of the 70-production line gave a very good response. It was found that employees competed within the production line to develop better. In addition, employees also help fellow employees who are not able to meet their goals and help develop their friends to have expertise until they reach the goal of becoming Grade A employees. On a production line size of 70, there is information given before practice and feedback, for a total of 7 It was found that there was an improvement in productivity and a reduction in defects. Round 1 is the employee's normal operation. Without having yet provided information before practice (feed forward) and feedback each employee has production that has not yet met the specified criteria of 8 balls per minute because the employee performed the job without having seen the communication media. Learn (work instruction) with video media on new methods of working. But it was operating in the same way as before. But when developing skills and extending time for employees to practice and provide information before practice and feedback, and have employees watch learning media (work instruction) and media that are videos of model employees (best practices). It will be seen that in rounds 2–8, it was found that most employees were able to work with increased productivity continuously for about a round. At 4–5, the productivity began to increase until it reached 8 balls per minute. In addition, it was found that employee number 2 had the specified productivity of 8 balls per minute in round 3, while the other employees still did not meet the criteria because employee number 2 had high competition. And it was found that the employees were in the age range of 20–30 years, with working periods of 1–5 years, male gender, but other employees' numbers were in the elderly. Their ages ranged from 40 to 45 years old. In addition, it was found that employee number 8 had the specified output of 8 balls per minute in the 3rd round and was not in the process of using the size 70 rail all the time. He was taken out to work on the line. Other production, but the employee can do this because employee number 8 was close to employee number 2. Employee number 8 was in the age range of 20–30 years, with a working period of 1–5 years and gender were male.

It can also be explained that workers on a production line with a capacity of 70 were responsible for the flaws resulting from the eye-trimming of pineapples. Due to the employees' adherence to their own level of familiarity during the first round, the eye-pecking flaws were high—roughly 1.40% or higher. Following the guidelines, flaws were found to have decreased to about 0.48%, or less than 1%. When information was given prior to practice and feedback (Feedforward and Feedback) in the second round. Employee number 1 was discovered to be ill, making data collection impossible. Employee number 2 discovered in the first round that losses or defects were roughly 1.40%, but when information was provided before practice and feedback (feedforward and feedback), it was found that defects

or losses gradually decreased, with an average of 0.2–0.3%. and employee number 8 for the first time found Defects or losses were approximately 0.80%, but when information was provided before practice and feedback (feedforward and feedback), it was found that defects in the 3rd round decreased to approximately 0.40%, consistent with other employees. In the third round, the other rounds were not collected because employee number 8 was removed to work on another production line. But the employee was able to perform well because employee number 8 has a position standing close to employee number 2. It will be found that employee number 8 has high skills and can learn quickly. Therefore, working with employees with low skills in proximity to skilled employees contributes to employee motivation and learning from each other.

The productivity of the pineapple trimming production line was 80. It can be explained that Round 1 was the employee's normal work. which has not yet provided information before practice and feedback (Feedforward and Feedback). From the first round of information provided before practice and feedback (Feedforward and Feedback), it was found that each employee has production that has not yet been met. The specified threshold is 8 balls per minute because most of the employees were elderly. They are in the age range of 41–50 years; most are female, making them learn quite slowly. But when the time is extended for employees to have training and provide information before practice and feedback (feedforward and feedback). Learning media (work instruction) and video media of model employees (best practices) It could be seen that in each round where information is provided before practice and feedback (feedforward and feedback), most employees was able to work and increase productivity. Continuously increasing gradually Everyone will be at the same level. Overall, in the 8th round, the productivity began to trend up until it reached 8 balls per minute. Everyone met the target set in the 8th round. In addition, employee number 2 got the specified productivity of 8. goals per minute in the 5th round, while other employees got 6 goals per minute, which still hasn't met the criteria. It was found that employee number 2 was in the age range of 31–40 years, with a working period of 1–5 years, and was female. But other employees are elderly, with an average age of 41–50 years.

Development of reduced defects on production line size 80. It can be explained that defects or losses from trimming pineapple buds are caused by the performance of the employees of the 80-year production line. In the first round, the employees performed their duties according to their own familiarity, so the defects due to eye-scrubbing were quite high. is approximately 2.2% or more. When information is provided before practice and feedback (feedforward and feedback) in the 2nd round, it will be found that defects have decreased by approximately 1.40%, still not meeting the specified criteria, which was not more than 1%. In addition, it will be found that employee number 8 in the first round found that defects were approximately 1.40%, but when information was provided before practice and feedback (feedback and feedback), it was found that defects gradually decreased, with an average of 0.30–0.40%, due to a service life of more than 10 years and that he was a factory trainer. While employee number 2 in the first round found defects were approximately 1.50%, when information was provided before practice and feedback (feedforward and feedback) in rounds 8–9, it was found that defects decreased. has an average of 0.20–0.30%, while other employee numbers have an average of 0.30–0.30% fewer defects.

Productivity of pineapple trimming production line size 83. It can be explained that Round 1 is the employee's normal operation. without having yet Providing information before acting and giving feedback (Feedforward and Feedback), which was from giving information first Practice and feedback (forwarding and feedback) Round 1 found that each employee has

production that has not yet met the specified criteria of 8 children/minute because the employees performed their work without having seen the learning media (work instruction) and video media. But it was operating in the same way as before. When extending the time for employees to practice with information before practice and feedback (Feedforward and Feedback) and allowing employees to watch learning media (Work Instruction) and media that are videos of model employees (Best Practice), it will be found that the employees of the production line size 83 have developed quite quickly. It could be seen that with each round of information given before action and feedback (forward and feedback), there has been an improvement. It was also found that most of the employees of production line size 83 were in the age range of 20–30 years, with a working period of 1–5 years. Overall, by providing information before the seventh round of practice, productivity began to tend to increase. until reaching 8 balls per minute, exceeding the set target. In addition, it was found that employee number 5 achieved the specified productivity of 8 balls per minute in the 3rd round, but while other employee numbers had not yet met the criteria, it was found that employee number 5 was still old. Between 20 and 30 years, the working period was 1–5 years, and the gender was male. In addition, it was found that employee number 6 had a specified productivity of 8 balls per minute in the 4th time, with employee number 6 having a standing position next to employee number 5, making it more than that. competition, but the age of employee number 6 was in the age range of 41–50 years, the working period was 1–5 years, and the gender was female, while other employees will receive the output as specified in the 6th–7th round.

With improved defect reduction on production line size 83, it could be explained that the defects from pineapple eye-cutting were caused by the work of employees on production line size 83. In the first round, the employees performed the work according to their own familiarity, causing the eye-pecking defects to be rather high. It was approximately 1.65% or more. In the second round, it was found that the defects of some employees were higher because they were not yet accustomed to working in a new way and wanted to meet the set goals. Therefore, there were more defects. When employees become accustomed to the new way of working, this makes the average defect of every employee approximately 1.70%. It was found that employee number 6 in round 3 had defects at 0.80%, while for employees' numbers 1, 2, 3, 4, 5, 7, 8, 9, and 10, the average defect rate was 1.3%. Therefore, it could be seen that employee number 6 was an employee who had skills in performing work that reduced defects better than other employee numbers. And in rounds 4–8, it was found that all employees' defects decreased equally, with an average of 0.60%. The specified criteria were not more than 1%.

Productivity and Defection

After training employees by means of providing information before practice and feedback (feedback and feedback), it was found that during operation, the average productivity increased by 39% compared to the first and last time while operating. It was also found that productivity increased and defects in the process from operations were reduced on average by 60%, as shown in Table 1, 2.

Production line	Before improvement	After improvement	% Increasing
70	7.53	9.36	19.55
80	4.61	8.73	47.16
83	4.69	9.66	51.45

Table 1: Comparison the % productivity from employee pineapple-trimming before and after training of each size

Product line	Before improvement	After improvement	% Decrease
70	0.38	0.3	21.05
80	1.59.	0.34	78.62
83	1.62	0.28	82.72

Table 2: Comparison of % defect before and after training by using feed forward & feedback (Std. %defect 0.80%)

Conclusion

The 70-size production line in collecting the first round before starting to develop skills for employees. There was a product that has not yet been made by the standard criteria specified 8 balls/minute. The average of 5.2 balls/minute and the defects from the chopped eye chopper up to 1.4 %, which was more than the specifications set at 1 % after the operation. Providing information before operation and feedback by developing skills through the working manual. The best work sample video in the 2nd - 8th round of employees has been developed to meet the target. All employees can reduce the defects from pineapple eyes lower than the average requirements at approximately 0.48.

The 80 -size production line found that in the first round of data collection before starting to develop skills for employees. The average productivity was 3.4 balls/minute, which had not yet been by the standard criteria of 8 balls/minute and defects from pineapples up to 3.5 %, which was more than the specifications set at 1 % after providing information. Before the feedforward and feedback and learning through the working manual and the best work sample video in the 2nd - 9th round. It can be observed that employees have improved continuously until they can pass the 8 -8-minute standards per minute. Pineapple eyes were lower than the 4th round of 0.62 %.

The 83-size production line found that in the first round of data collection before the development of skills for employees. The average productivity was 3.8/minute, which had not yet been by the standard criteria for 8 balls/minute and defects from pineapples up to 2.6 %, which is more than the specifications set at 1 % after providing information first. Feedforward and feedback by developing skills through the work guide and videos, samples of the best work from the prototype staff, in the 2nd round of the staff, the employee has developed in a better way. Continuously until the 7th round, most employees can pass the standard criteria, and in the 4th round, can reduce the defects from pineapple eyes by everyone's requirements. In addition, found that an average of 39 % increased productivity compared to the first round of data collection that had not been developed. The defects caused by the production process decreased by 60 % and when the production line was analyzed, it was found that factors that influence employees' skills training for increased productivity. Point out that male employees were effective in operating better than female

employees, with an average productivity of 10.33 per minute. Daily employees were more effective than monthly employees, with an average productivity of 9.29 per minute. Suitable for operations will be in 21 - 30 years, with an average productivity of 8.28 per minute. In addition, it was found that the age of 1 - 5 years had the most performance, with an average productivity of 8.27 minutes per minute.

The finally, the feedforward and feedback technique has proven to be the best way to train and develop the staff's skills. After the staff has been trained about the "peel and tweak the eyes" procedure, it increases the staff's performance. The result shows that they understand better, grow in their performance, and work more efficiently. Furthermore, productivity increased whether employees work the same amount of time or less. Thus, the key factor for success was the peer-assisted learning strategy, including feed-forward and feedback training techniques as well.

Suggestion

From the study of factors that influence the skills of staff skills for production, Human resource will use to plan for people to work.

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Learning of Successors in Long-Lived Family Firms: Knowledge Construction for Entrepreneurial Mindsets

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Abstract

This study explores how successors in long-lived family firms learn entrepreneurial mindsets that orient the reconfiguration of unique resources of family firms. Learning to shape business values and beliefs is important for successors because values and beliefs are the firms' core related to organizational identity and culture. Entrepreneurial mindsets are values and beliefs that pursue opportunities. Our previous research about long-lived family firms showed that entrepreneurial mindsets are one of the elements learned from transgenerational family knowledge and that successors have complex learning of explicit and tacit knowledge. This research to deepen entrepreneurial mindsets is a case study of semi-structured interviews with family managers of 15 family firms — nine firms of several sectors in Hokuriku district and six traditional food sector firms — over 100 years since their establishment in Japan. The results show three types of learning for entrepreneurial mindsets.

· Learning entrepreneurial mindsets from transgenerational family knowledge.
· Recognizing the constrictive resource value of the family business and forming entrepreneurial mindsets from self-learning or external experience forward retrieve of the family business.
· Recognizing VRIN (Valuable, Rare, In-imitable, and Non-substitutable) resources of the family business and learning conservative mindsets to maintain current resources.

The transgenerational transfer of family values is a key factor in the persistence of a family business. In addition, forming an entrepreneurial mindset of the successor derived from concern for the decline of the family business provides resilience to the longevity of a family business.

Keywords: Family Business, Successor, Familiness, House Percepts, Entrepreneurial Mindsets

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Introduction

Most small and medium-sized enterprises (SMEs) in Japan are family businesses, and their business succession is recognized as a social issue due to the aging of family business managers. A large number of long-lived firms characterizes family business in Japan. Long-lived family firms that have been in business for more than 100 years have a high rate of family succession, and a low rate of not having a predetermined successor (Teikoku-Databank, 2022). The data suggest that family succession in long-lived family firms is more stable and that their longevity is not merely a consequence.

Cabrera-Suárez et al. (2001) emphasized the importance of transferring tacit knowledge to the process of family business succession. Tacit knowledge is personal, contains subjective insights, and is rooted in individual actions and experiences, together with the ideals, values, and feelings that individuals hold (Nonaka & Takeuchi, 1995). Transfer of tacit knowledge is not as easy as that of explicit knowledge. In Japan, there is a history of transgenerational transfer of values and beliefs for family business as house precepts (Adachi, 1970). The practice partly remains. Though traditional house precepts are written or oral, Taomoto (2012) identified tacit house precepts in family businesses. In this study, house precepts refer to transgenerational values and beliefs in a family business learned explicitly and tacitly by successors.

The resources unique to a family firm provide it with advantages, so it's necessary to manage the resources' value (Habbershon & Williams, 1999). Chujo et al. (2021) identified values for innovation in house precepts across generations in long-lived family firms. In this study, values for innovation are substituted by entrepreneurial mindsets, which refer to values and beliefs that orient a person to entrepreneurship (Habbershon et al., 2010). This study explores how successors in long-lived family firms learn entrepreneurial mindsets and enhance unique resources of family firms through successors' activities.

Literature Review

Knowledge Construction of Successors

Le Breton-Miller et al. (2004) posit that the transmission of knowledge during succession in family businesses begins cleverly and imperceptibly in the home. Based on a case study of a family business in Europe, Lambrecht (2005) found succession to the next generation to be a time-consuming and ongoing process. Martínez et al. (2016) argue for knowledge acquisition from outside sources and the transgenerational knowledge transfer inside a family. Woodfield and Husted (2017) assumed that the knowledge held differs between generations of a family, and that there is bi-directional knowledge sharing between predecessor and successor. Cabrera-Suárez et al. (2018) found that not only transgenerational knowledge transfer, but also family members, employees of the family, external stakeholders, work experience outside the family business, and education received outside the firm, affect the knowledge construction of the successor, which in turn affects their entrepreneurship.

Familiness

In the approach to study the advantages of family firms, Habbershon and Williams (1999) focused on Valuable, Rare, Inimitable, Non-substitutable (VRIN) resources unique to historical family firms from Resource Based View (RBV) concept of Barney (1991),

Familiness refers to the unique bundle of resources derived from the interaction between the family and the family business, and has both, positive and negative aspects, and is classified into either "distinctive familiness," when it possesses resources that produce advantage, or "constrictive familiness," when it does not (Habbershon & Williams, 1999). Familiness contains shared values/vision of a family (Pearson et al., 2008), a family brand with long history Zellweger et al. (2010), management philosophy and corporate culture (Zellweger et al., 2010), and relationship with stakeholders (Habbershon & Williams, 1999). From the identity dimension of familiness, a successor has overlapping family, organizational, and individual identities, and the overlapping influences the forming of the successor's values (Zellweger et al., 2010). Making distinctive familiness sustainable needs appropriate resource management (Habbershon & Williams, 1999). It is important for the longevity of family firms how the entrepreneurship of successors manages the unique resources of a family business.

Knowledge and Intellectual Capital

Marr et al. (2004) present two streams of research on knowledge in business management. One views knowledge as an entity related to an interpretation of information sets and experience (Albino et al., 2001). Nonaka and Takeuchi (1995) argue that knowledge is related to beliefs in a particular position and to purposeful action. The argument shows that house precepts are knowledge because they are values and beliefs for the family business. The other stream views "knowledge assets as a major part of an organization's value" (Marr et al., 2004, p. 553). The concept of intellectual capital can be presented from this perspective. Intellectual capital refers to knowledge, information, intellectual property, and experience that can be utilized to create wealth (Stewart, 1997). Intellectual capital comprises structural, human, and relational capital. Structural capital includes intellectual property, business processes (including explicit and implicit procedures and rules), corporate philosophy, and corporate culture; while human capital includes skills, know-how, and abilities; and relational capital includes customers, customer loyalty, sales channels, and brands (Guthrie & Petty, 2000). Intellectual capital mostly fulfills VRIN criteria (Teece, 2014), so the perspective is suitable for familiness research.

Research Model and Research Questions

Our research model is as follows:

The entrepreneurship of successors in long-lived family firms relates to learning the entrepreneurial mindsets from the house precepts (Chujo et al., 2021). The knowledge construction in the process of successor learning involves not only family members, but also employees of the family firm, external stakeholders, and work experience and education received outside the family firm in question (Cabrera-Suárez et al., 2018).

The knowledge construction of a successor shapes his/her own values and beliefs, and entrepreneurial activity based on them integrates resources toward distinctive familiness.

The reason is that sustaining distinctive familiness requires proper resource management (Habbershon & Williams, 1999).

The research model conducts the following research question:

- – How do successors in long-lived family firms learn entrepreneurial mindsets and integrate familiness as unique resources of family firms?

Methodology

This study adopts an inductive approach, using qualitative case studies. Case studies examine a phenomenon in context, where the boundaries with the context are unclear (Yin, 2018). This study explores learning by the successors of long-lived family firms, with family businesses as the context. Defining a research question provides clues (Yin, 2018), and focus (Eisenhardt, 1989), for the research. We have already defined the research question of this study above.

The unit of analysis for the cases in this paper is the successor. We distinguish successors from predecessors, considering their pre- and post-succession situation as successors. This study examines multiple case studies, which are more robust and offer greater explanatory power than single ones (Herriott & Firestone, 1983; Yin, 2018). Qualitative studies use theoretical sampling. Theory sampling selects cases likely to replicate the emergent theory (Eisenhardt, 1989). Sampling was conducted according to the purpose of this study and the research question. Long-lived family firms refer to having a history of over 100 years from its establishment, managed by family members, at least partially owned by a family, and succeeded by a family member. Firms are to be small and medium-sized enterprises. Interviewees are management members of the family businesses, who are party to the succession process. From the successor's corporate website, the company history, house precepts, as well as values and principles manifest, in part, in the management philosophy and corporate brand. By selecting firms for which information is, at least, partially available, it becomes possible to check for consistency with the interview data.

This study assigned two survey groups to find the difference between the same sector and different sectors. Survey 1 considers a wide range of sectors in Hokuriku region. Survey 2 examines the traditional Japanese food industry in a wide area of Japan (see Table 1).

	Area	Firm	Sector	Outline
Survey1	Hokuriku	A	services	hotel and restaurant
		B	industry	Japanese sake
		C	retailing	foods
		D	industry	printing
		E	industry	construction
		F	industry	Japanese sake
		G	industry	material
		H	industry	fermented foods
		J	retailing	Japanese lacquer ware
Survey2	Don't care	P	industry	fish processing
		Q	industry	vinegar
		R	industry	fermented foods
		S	industry	vinegar
		T	industry	fish processing
		U	industry	Japanese sake

Table 1: Overview of Interviewed Firms

Following the interview guide created by the research model, semi-structured interviews with successors collected data from 15 family firms. Semi-structured interviews feature more general questions and offer greater freedom in the order and content of questions than structured interviews do (Bryman, 2016). The interviews accorded priority to situations in which the interviewee was comfortable talking. Interviews were conducted either in person or via videoconferencing. There were no differences in the content due to the interview method.

Interviews were recorded and transcribed. Transcribed text was coded using Verbi's MAXQDA data analysis software, in order to perform in-case analysis, from which code relationships were identified. In-case analysis widely covered historical value, house precepts, succession process, and business activity of a successor to identify hidden factors related to entrepreneurial mindsets. A cross-case analysis identified concepts in Table 2.

concept	definition
Learning entrepreneurial mindsets	Learning entrepreneurial mindsets from house precepts and family business history orients a successor to entrepreneurship in a family business.
Learning conservative mindsets	Learning conservative mindsets from house precepts and family business history orients a successor to maintaining VRIN resources of a family business.
Recognizing constrictive familiness	A successor recognizes constrictive familiness that means decline of valuable resources in a family business.
classification of integrating resources	Sirmon et al. (2007)
Stabilizing	Making minor incremental improvements
Enriching	Adding a complementary resource from the resource portfolio to the current bundle
Pioneering	Integrating completely new resources

Table 2: Focused concepts in cross-case analysis

Results

Overview of Results

Table 3 presents the results of the cross-case analysis regarding entrepreneurial mindsets, recognizing constrictive familiness, and integrating resources. Integrating resources indicates strength and content manipulated in human, structural, and relational capital.

Learning entrepreneurial mindsets and recognizing constrictive familiness are not mutually exclusive concepts, and their coexistence is possible. However, this study did not find the combination. The conceivable situation is that, despite some entrepreneurial activities or resource integration efforts, the value of familiness has declined. In this scenario, it might be more difficult to recognize opportunities for new resource integration, or greater risk-taking might be required.

They are classified into the following three categories by sorting based on learning entrepreneurial mindsets and recognizing constrictive familiness:
      Type1: Firm A, B, D, F, G, H, P, Q, R, S
      Type2: Firm C, E, J, T
      Type3: Firm U

	Firm	Learning entrepreneurial mindsets	Learning conservative mindsets	Recognizing Constrictive familiness	Bundling Rsources			
					strength	human capital	structual capital	relational capital
Type1	A	O			Enriching			O
	B	O			Enriching		O	O
	D	O			Enriching		O	O
	F	O			Enriching		O	O
	G	O			Pioneering	O	O	O
	H	O			Enriching		O	O
	P	O			Enriching			O
	Q	O			Enriching		O	O
	R	O			Enriching		O	O
	S	O			Enriching		O	O
Type2	C			O	Pioneering	O	O	O
	E			O	Enriching		O	O
	J			O	Enriching		O	O
	T			O	Enriching			O
Type3	U		O		Stabilizing			

Table 3: The results of the cross-case analysis

Result of Type 1

Successors learn entrepreneurial mindsets in various ways from house precepts. Explicit house precepts show values and beliefs simply, so successors understand the essential meanings during their management.

> *One of our house precepts is "Tradition is a continuation of innovation." …For the first time, I thought the house precept was overstated…I understood the meaning through my management of the family business.* (Firm F)

The history and legacy of family business give tacit house precepts to successors.

> *The founder was a trader...The second generation president became a manufacturer of soy sauce brewers… My father was the third generation, and he expanded into soybean paste brewing.* (Firm H)

> *I found a cool storage place in an old warehouse. My grandfather must have constructed it for improving products… I believe that I inherited his values.* (Firm B)

The successor undertakes enriching or pioneering for integrating resources, so revises familiness to adapt to environmental change. Figure 1 shows the model of Type 1.

House Precepts

Entrepreneurial Mindset	→	Learning of Successor	→	Entrepreneurship	→	Enriching/pioneering for Integrating Resources

↓

Revised Familiness
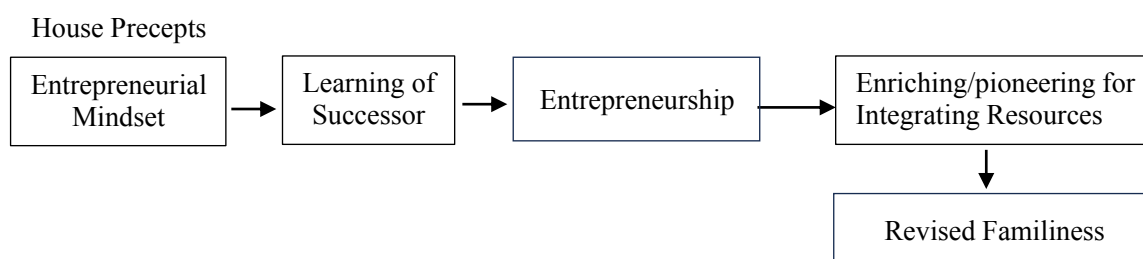
Figure 1: The model of Type 1

Result of Type 2

In this type, the entrepreneurial mindsets of house precepts do not appear.

The successor recognizes constrictive familiness. Inadequate management of familiness, or environmental changes may render familiness constrictive.

> *At that time, the plastering business was in decline; I felt succession would give me a tough job.* (Firm E)

> *Lacquer shop was not hopeful for the future, so my father never told me to continue the business.* (Firm J)

> *While working for a family firm, I realized the limits of the business.* (Firm C)

The successor thus forms entrepreneurial mindsets his/herself and adopts enriching or pioneering for integrating resources.

> *I thought about establishing a lacquerware shop, and then joined a famous lacquerware shop for training.* (Firm J)

I thought of transformation from delivering to having customers come to buy… I learned my new business through self-study, excluding participation in seminars and advice from the businesspeople concerned. (Firm C)

A successor's commitment to contribute to the family business as an extension of the family derived from the overlap between the family and organizational identity may orient him/her to entrepreneurship (Zellweger et al., 2010). Figure 2 shows the model of Type 2.
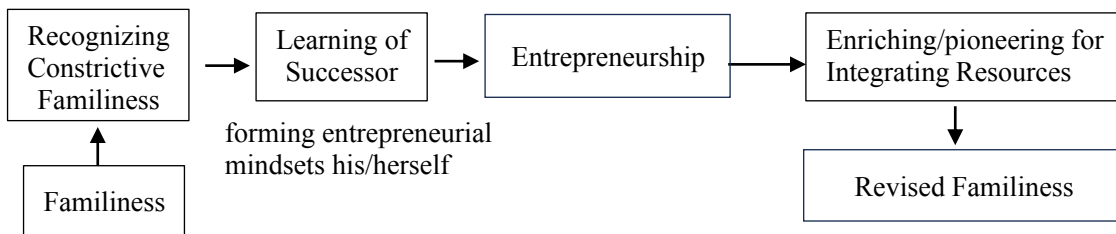
Figure 2: The model of Type 2

Result of Type 3

Company U's products have historically been highly popular and have maintained their methods and taste. Its process differs from the commonly employed methods today; it is the only company that maintains both, traditional processes and taste, and has high VRIN resources. The successor takes over historical values and maintains familiness, with minor alterations. Figure 3 shows the model of Type 3.
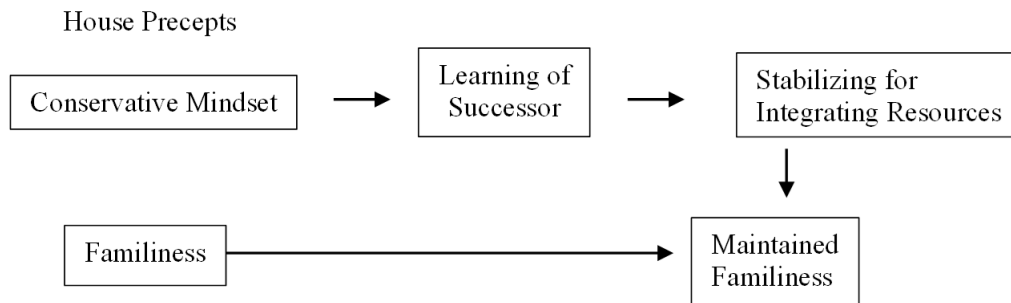
Figure 3: The model of Type 3

Discussion

Successors to family businesses often begin to learn about the family business from an early age because they can communicate with a predecessor in the family house daily. This environment inspires natural learning about the family business and supports absorbing entrepreneurial mindsets.

Such an environment for successors facilitates the learning of the values of the entrepreneurial mindsets in Type 1. Type 1 offers the highest family business sustainability of the three types, because the entrepreneurial mindsets are transferred across generations and the entrepreneurship derived from the mindsets integrates resources to adapt to environmental change. Enriching of integrating resources retains the company's core values and expands into the periphery with fewer risks. Transgenerational pioneering is most likely limited

because pioneering is more aggressive than enriching and entails more risks (Asaba & Yamanoi, 2022).

Type 2 shows that the successor recognizes the constrictive familiness and forms entrepreneurial mindsets of their own. Constrictive familiness means constrictive resource value because of inadequate adaptation to environmental change. The reason for forming entrepreneurial mindsets is most likely the successor's attempt to contribute to the family business as an extension of the family (Zellweger et al., 2010). Previous research on family firms in Japan shows that the combination of tradition and innovation, referred to as "Enrichment" in Type 1, is one of the factors in their longevity (Asaba & Yamanoi, 2022; Yamada, 2013). This research also identified that forming entrepreneurial mindsets from recognizing the constrictive resource value is valid to retrieve unique resources of a family business. Type 2 demonstrates the resilience of family businesses in recovering from a state of decline.

Type 3 has the characteristics that the family business contains sustainable VRIN resources, and that a successor learns conservative mindsets of house precepts. The sustainability of Type 3 depends on the sustainability of the value of the VRIN resources. The sustainability of Type 3 may be uncertain. A part of Japanese traditional culture has most likely the persistence on business of Type 3.

Conclusion

This study explored the construction of knowledge regarding the entrepreneurial mindsets of family business successors in a dynamic environment. We found the following three types of successor entrepreneurial mindsets in long-lived family firms:

- Learning entrepreneurial mindsets from transgenerational family knowledge.
  - It provides transgenerational entrepreneurship to adapt to environmental change, so a family business is stable for persistence.

- Recognizing the constrictive resource value of the family business and forming entrepreneurial mindsets from self-learning or external experience forward retrieve of the family business.
  - The learning of a successor different from the above gives resilience to the longevity of the family business.

- Recognizing VRIN (Valuable, Rare, In-imitable, and Non-substitutable) resources of the family business and learning conservative mindsets to maintain current resources.
  - The values and beliefs of a family are to inherit Japanese traditional culture.

The transgenerational transfer of family values is a key factor in the persistence of a family business. In addition, forming an entrepreneurial mindset of the successor derived from concern for the decline of the family business provides resilience to the longevity of a family business.

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Use of Contextualized Activity Sheets in Improving Students' Knowledge on Climate Change

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Abstract

As a major global issue, climate change is one of the topics in the senior high school curriculum, specifically in the Earth Science subject. Designing instructional materials in which the learners can relate their personal experiences to climate change plays an important role in enriching their knowledge about climate change. This paper aims to develop and evaluate the use of contextualized activity sheets to improve grade 11 students' knowledge on climate change using the PDSA framework. The researcher-made contextualized activity sheets are composed of six activities anchored to the Department of Education (DepEd) learning competencies. Experts in the field of science education and environmental science validated the contextualized activity sheets, where an overall mean rating of 4.51 is interpreted as Very Acceptable. In addition, pre-test and post-test on the climate change concept test were administered to 157 students to measure the students' knowledge. The results showed that the use of the contextualized activity sheets has a significant difference on the students' knowledge on climate change from the pre-test and post-test, while the Cohen's d result indicated that it has a medium effect on students' knowledge. These results suggest that the contextualized activity sheets can enrich the students' knowledge on climate change and can still be enhanced to suit the needs of other learners from different localities.

Keywords: Climate Change, Contextualization, Knowledge

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Introduction

Climate change is defined as a long-term change in the state of Earth's climate, or a region caused by changes in the greenhouse gas concentrations in the atmosphere either due to natural phenomena or anthropogenic causes (Cruz et al., 2017). To address this global issue, several scientists have proposed two main strategies, namely: mitigation and adaptation. As an effort to mitigate climate change, the United Nations Framework Convention on Climate Change (UNFCCC) issued a protocol which encourages the developed countries to make the first move to reduce their greenhouse gas emissions and help the developing countries to the same. However, for these efforts to be deemed successful, all levels of society should act and to make it happen, transfer of appropriate knowledge must be done (Anderson, 2010; Ledley et al., 2017). To reach such a wide community, a powerful tool such as formal education in schools is needed.

Although most people claim that experience is the best teacher, in the case of climate change, learning from experience will require decades and even millennia. In a span of months, formal education in schools can excellently convey appropriate knowledge and promote learning that leads to action of the young generation of students (Garcia, 2015; Harun et al., 2011). In the Philippines, the study of Nuñez & Clores (2017) found out that K-10 completer have a moderate level of environmental literacy and environmental knowledge. They have argued that environmental education among Filipinos is a necessity so that students can participate in conserving and protecting the environment. Thus, the DepEd developed the Climate Change Education for Sustainable Development modules to use visual materials in stimulating impactful discussion on climate change.

Thus, this paper aims to fill the gap between the need to connect the students to local climatic conditions and the effort of DepEd in developing modules for climate change through contextualization. Contextualization is defined as the process of developing new skills and knowledge among students through presenting subject matter and using authentic materials which are meaningful and relevant to them (Ballesteros, 2015; Garin et al., 2017). It is the assumption of this study that after the implementation of the contextualized climate change activity sheets, there will be an increase in the students' knowledge on climate change.

The need to contextualize learning materials used in teaching was presented in several research in the Philippines. In other disciplines such as Mathematics and Languages, it was argued that teachers need to localize examples, exercises, and illustrations to improve students' performance (Egcas et al., 2017). Hence, this approach can also be used in Science not only to enhance the performance but to promote lifelong learning as well.

Conclusion

Materials and Methods

The study employed an action research design using a quasi-experimental approach. All the participants were subjected to the intervention, the use of the contextualized activity sheets. The quantitative data were collected from pre-test and post-test of the Climate Change Concept Test and were analyzed using the Statistical Package for Social Science (SPSS) software to determine the mean and standard deviation, as well as if there is a significant difference between the pre-test and post- test scores. 154 students from the four sections of Grade 11 students of De La Salle Medical and Health Sciences Institute Special Health

Sciences Senior High School (DLSMHSI-SHSSHS). The module implementers on the other hand were two Earth Science teachers in the school.

Prior to the implementation of the activity sheets, the student participants took the Climate Change Concept test to determine their initial knowledge about climate change. The activity sheets were implemented in October 2020 of the school year 2019-2020 for two weeks. At the end of the implementation, the students took the Climate Change Concept test again to determine the level of their knowledge about climate change.

Results and Discussion

The average pre-test mean scores (Table 1) of the students show that they have a moderate level of knowledge about climate change before using the contextualized activity sheets. It can also be observed that most of the students are somehow familiar with the topics under climate change.

Table 1: Students' pre-test scores on the climate change concept test

	Mean Score	SD	Verbal interpretation
Factors affecting climate	8	1.92	High level
Global climate phenomenon	7	2.15	Moderate level
Overall	15	3.36	Moderate level

Table 2 shows the pre-test and post-test results the students. It can be observed that the use of the contextualized activity sheets helped the students understand the topic better. As a result, their performance yielded high post-test results.

Table 2: Changes on students' knowledge about climate change

Pre-test mean	SD	Post-test mean	SD	t	Cohen's d	p-value
15.29	3.36	17.54	3.18	-9.45	0.69	0.0000…

Moreover, the p-value is less than 0.05 which indicates that there is a significant difference between the mean score of the pre-test and the post- test. It can be inferred that the students' knowledge about climate change improved after using the activity sheets. The Cohen's d value, on the other hand, is 0.69 which shows that the contextualized activity sheets have a medium effect on students' knowledge test. This implies that the materials have average impact on the improvement of the scores in the given concept test about climate change.

These results further proved that contextualizing the activities plays an important role in enriching the students' knowledge. The students were able to understand the relationship between what is being learned in the classroom and what is being seen in the real-world. In a similar study about contextualization, Giamellaro (2014) observed that there was an increase in the students' conceptual understanding in science when an authentic context was given (Giamellar, 2014). A study of Rivet & Krajcik (2008) also implied that contextualization in a science classroom is a way to facilitate the improvement of students' understanding of

difficult science concepts. These are because in contextualization, students have a personalized and first-hand perspective in what they are learning.

The use of contextualized activity sheets can be included in the teachers' strategy for teaching climate change to provide an authentic way for the students to understand the topic better. This can also open a room for discussion among stakeholders to consider the local conditions which can also be included in the materials.

Recommendations

Through the use of the activity sheets, the students who don't have access to the online resources which can help the understand climate change better can be given opportunities to use these kinds of materials. As a result, they are more involved in the learning process since their experiences are taken into consideration in designing the instructional materials. As seen from the results of this study, the use of such materials improved the students' knowledge on climate change.

From the implications of the results, the following suggestions can be done in the future studies, (1) teachers can work with other stakeholders such as school administrators and government agencies to modify these materials with a locality-specific context in mind, (2) the discussion of the concepts can be provided to develop a module which students can use at their own pacing., (3) The contents of the contextualized activity sheets can be modified by other educators to suit the needs of the learners in the lower grade levels, and (4) the activity sheets can be made available in different platforms to make it more accessible to the teachers and the learners who are currently adapting to the changes brought about by the pandemic.

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Teacher's Perception of Independent Learning Curriculum in Pancasila Education Learning in Grades I and IV Bandung City Public Elementary School

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Abstract

This research aims to describe teachers' perceptions of the independent learning curriculum policy in grades I and IV at state elementary schools in Bandung. This research uses qualitative research, and this research uses a phenomenological research design. Phenomenological analysis examines elementary school teachers' opinions regarding the independent learning curriculum policy in Pancasila education learning. The respondents in this study were elementary school teachers. The reason for choosing classes I and 4 is because those classes were the first to implement the independent curriculum. In this research, the data collection used was interviews. All interview data is collected so that it can be studied descriptively to obtain reliable and trustworthy findings. The research results are as follows: (1) Teachers appreciate the independent learning curriculum policy implemented in elementary schools, (2) The importance of the teacher's role in implementing independent learning curriculum learning in Pancasila education learning, depends on each teacher. , (3) Teachers have the opportunity to develop and implement the curriculum and plan learning to improve the quality of the teaching and learning process, (4) there are many platforms that discuss independent learning curricula that enable independent learning teachers to develop their skills, (5) but not all teachers has implemented an independent learning curriculum in his class. (6) for older teachers who have limited information and technology capabilities, (7) the obstacles to implementing the independent learning curriculum, especially in learning Pancasila education, also depend on the stability of internet conditions, especially for those who teach in remote schools, this is the main obstacle.

Keywords: Perception, Independent Learning Curriculum, Pancasila Education

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Introduction

Education is an effort to develop human potential so that they are able to adapt to life that continues to develop, in line with the demands of changing times. Every individual needs to get an effective education because high quality education will have a real impact on demographic success, in accordance with Law number 20 of 2003. In Indonesia this often happens curriculum innovation that is adapted to the needs of society and the country. The curriculum in Indonesia starts from the 1947 Curriculum to the Merdeka Curriculum continue to innovate (Alam, Sapriya, et al. 2023).

Education aims to optimize the potential of students so that they become individuals who have strong faith and devotion to God Almighty, have superior skills, are creative, independent, have noble character, are healthy, knowledgeable, and act as members of a democratic and responsible society. . To achieve effective educational goals, it is important to have a curriculum that can support the achievement of these goals (Maulida 2022).

The legal basis for implementing the MBKM (Free Learning Campus) curriculum is contained in several regulations, namely Minister of Education and Culture Regulation Number 3 of 2020 which sets Higher Education standards; Minister of Education and Culture Regulation Number 4 of 2020 concerning the Transformation of State Universities into Legal Entity Universities; Minister of Education and Culture Regulation Number 5 of 2020 concerning Evaluation and Accreditation of Study Programs and Higher Education; Minister of Education and Culture Regulation Number 6 of 2020 concerning Procedures for Accepting New Students for Study Programs at State Universities; and Minister of Education and Culture Regulation Number 7 of 2020 which regulates the Establishment, Changes, and Dissolution of State Universities, as well as the Establishment, Changes, and Revocation of Private Higher Education Licenses (Sopiansyah et al. 2022).

Formally, the Pancasila Education subject will replace PPKn in June 2022, in line with the implementation of the new Merdeka Curriculum in the 2022/2023 academic year. There are no substantial differences in characteristics or content between Pancasila Education and PPKn. Both of them still focus on four main consensuses: Pancasila, the 1945 Constitution, Bhinneka Tunggal Ika, and the Republic of Indonesia. However, what differentiates the two.

Currently, the Merdeka Curriculum is being implemented at all levels of education to overcome challenges in the teaching and learning process which has been disrupted by the pandemic. The government has given three options to schools in implementing the Independent Curriculum: (1) Freedom to Learn, (2) Freedom to Change, and (3) Freedom to Share. The implementation of the Independent Curriculum resulted in significant changes felt by teachers and all components involved in education. Learning administration, teaching strategies, and evaluations carried out by teachers will experience a transformation as a result of implementing the Independent Curriculum (Rahimah 2022).

The aim of this research is to find out how teachers perceive the independent learning curriculum implemented in Indonesia, especially in learning Pancasila education.

This research applies qualitative methods, which is a research approach that produces descriptive data, such as verbal reports in the form of speech or writing, as well as behavior that can be observed directly from individuals who are research subjects.

Qualitative research methods developed because there was a paradigm shift in the way we understand reality, phenomena or certain symptoms. This paradigm interprets social reality as something holistic, complex, dynamic and full of meaning (Sugiyono 2021).

Qualitative research is carried out to explore phenomena experienced by research subjects, such as behavior, perceptions, motivations, actions and other aspects in depth and descriptively using language and narrative. This research was carried out in a specific natural context and adopted more organic or natural methods (Moelong 2006).

Qualitative methods used include observation, interviews, and document review. There are several reasons why qualitative techniques are chosen. First, qualitative techniques allow adaptation to actual situations. Second, this technique directly reveals the dynamics of the relationship between researchers and respondents.

Qualitative research emphasizes quality over quantity, gathering information not through questionnaires but by using interviews, direct observation, and relevant official documents. A qualitative approach also prioritizes process over results. This is because the relationships between the elements under investigation become more detailed when observed in the process.

Through this qualitative approach, researchers will conduct observations, interviews and document analysis to provide respondents with a direct picture of teacher perceptions in the context of Independent Curriculum learning in grades I and IV at SDN Bandung City.

Method

This study applies phenomenological research methods. Researchers used a phenomenological (Nuryana, Pawito, & Utari 2019) approach to explore understanding of elementary school teachers' perceptions regarding learning Pancasila Education in the context of the Independent Learning Curriculum.

Phenomenology focuses on subjective experiences in a study. This approach is related to a person's personal outlook and perspective on the world and their interpretation of the various events they experience. This approach aims to understand extraordinary events experienced by individuals without any previous assumptions (Nuryana, Pawito, & Utari 2019).

Phenomenology is the study of what appears (phenomena). Thus, the focus of phenomenology is studying what arises from a phenomenon, so that any research or work that discusses how something appears is included in the domain of phenomenology. In the context of qualitative research that uses a phenomenological approach, we can actually apply phenomenology in everyday life. We naturally observe phenomena, then analyze them so that we can understand how they arise within us. Then, the next stage is to understand the phenomenon itself from its perspective, including how it appears and affects us.

This phenomenological research has an exploratory aim, where the focus is to reveal and explore a phenomenon that has not been previously explored or to enrich information that has been found in previous exploration. Exploratory research using the phenomenological method aims to present detailed and in-depth data and descriptions. The focus of this research is to explore, explore, identify and evaluate elementary school teachers' conceptions of

listening learning, taking into account various different perspectives and experiences (Khan 2014).

The selection of research subjects used the purpose sampling method because the samples were selected based on specific considerations. This consideration is a key factor in determining the sample for research because it is in accordance with the aims and objectives of the research (Sugiyono 2021).

The main consideration is that the informants are class I and IV standard school teachers who have experience developing the independent learning curriculum. The second consideration is that there is no element of coercion on the subjects who become informants. so that the informants who will be interviewed are based primarily on their needs and have met the standards as capable informants in the area under study. The third consideration is that the topics chosen are those who have experience in the field of basic education, especially teachers who are experienced in developing Pancasila education lessons.

To support phenomenological research, research subjects who are also informants must have a deep level of experience in their field. This allows the information obtained to become a source of innovation that is relevant to the research objectives. The selection of informants must pay careful attention to individuals who have significant experience and knowledge regarding the reality to be investigated in depth.

This research will be carried out on class I and IV teachers in the city of Bandung (SDN 053 Cisitu, SDN 208 Luginasari, and SDN 139 Sukarasa Bandung City), which is located in Bandung City, West Java Province. This research was carried out in the even semester of the 2022-2023 academic year.

This research was carried out by me, Faisal Alam, who is a postgraduate student at the Universitas Pendidikan Indonesia and also my lecturers named Professor Sapriya, he is a lecturer at the Universitas Pendidikan Indonesia, and also Dr. Agus Muharam is also a lecturer at the Universitas Pendidikan Indonesia.

Conclusion

SD Negeri 053 Cisitu is located at Jalan Sangkuriang no. 87, Dago, Coblong sub-district, Bandung city, West Java province. This school was founded in 2017 with the establishment decree 420/Kep.674-DisDik/2017 by the Bandung city national education office in collaboration with the Bandung city government based on a proposal from the local community on a land area of 2,916,749 M². According to the principal, the vision for establishing the school is to create students who are devout, accomplished, independent and have an environmental culture.

SD Negeri 208 Luginasari is located at Jalan Sukagalih No.11, Cipedes, Kec. Sukajadi, Bandung City, West Java Province. This school was founded in 1978 with the Decree on the Establishment of Presidential Instruction No. 6 of 1978 by the Bandung City National Education Service in collaboration with the Bandung City Government at the suggestion of the local community. The vision for establishing the school according to the head is to create students who have noble character, are intelligent, skilled, care about the environment and love national culture.

SD Negeri 139 Sukarasa Bandung City is located at Jl. Gegerkalong Hilir No. 82, Gegerkalong, Kec. Sukasari, Bandung City, West Java Province 40153. This school was founded in 1937 with establishment decree 420/Kep.674-Disdik/2017 by the Bandung City National Education Service in collaboration with the Bandung City Government at the suggestion of the local community. According to the head, the vision for establishing the school was "To create students who excel in science and technology and mathematics, think critically and creatively and are polite and cultured".

From the research results, several main findings can be presented as follows:

1. Appreciation of the Independent Learning Curriculum Policy: Teachers appreciate the independent learning curriculum policy implemented in elementary schools.
2. The Central Role of Teachers in Implementing the Learning Independence Curriculum: The importance of the teacher's role in carrying out learning based on the criteria of learning independence, especially in the context of Pancasila education learning, really depends on the individual role of each teacher.
3. Opportunities for Curriculum Development and Learning Planning: Teachers have the opportunity to develop, implement and plan learning to improve the quality of the teaching and learning process.
4. Availability of Platforms for Self-Study: There are many platforms that cover self-study curricula, providing opportunities for teachers to enhance their skills. However, not all teachers implement this curriculum in their classes.
5. Challenges for Teachers with Technological Limitations: Teachers who are older and have limited technological abilities face challenges in implementing a self-paced learning curriculum.
6. Main Obstacle: Internet Conditions in Remote Schools: The main challenge in implementing the independent learning curriculum, especially in Pancasila education learning, is dependence on internet stability, especially for teachers who teach in remote areas.

These findings provide a fairly comprehensive picture of how the Merdeka Belajar curriculum is perceived and implemented in the elementary school environment. The existence of challenges related to the role of teachers, availability of platforms, as well as technological barriers and internet access provide a basis for improving policies to better deal with these obstacles.

Acknowledgements

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The Influence of Self-Concept on Interest in Becoming a Teacher in Indonesian Students of Mathematics Education

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Abstract

This study aims to determine the influence of self-concept on interest in becoming a student teacher in the Mathematics Education study program at a private university in Indonesia. The method used in this study is a survey method with a descriptive-quantitative approach. The sample used in this study was made up of students of the Mathematics Education study program Class of 2021, with 16 students. Data collection techniques using questionnaires. The total number of respondents used was 16 students. The prerequisite test of analysis consists of a normality test. Test the hypothesis of this study using simple linear regression. The results showed that self-concept had a moderate influence on interest in becoming a teacher with results of 48.1% and 51.9% influenced by other factors, consisting of internal factors such as individual personality factors and external factors such as parental factors, peer factors, gender factors, cost factors, and employment factors. Student self-concept affects students' interest in becoming teachers, for that students need to be given direction and understanding of the importance of good self-concept, especially as holistic educators.

Keywords: Self-Concept, Becoming Teacher, Mathematics Education

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Introduction

Education become an important role in human life (Aspi & Syahrani, 2022; Illu & Gea, 2021; Subakti & Prasetya, 2022). Indonesian Law Number 20 of 2003 says that education is a conscious effort and is designed to create an atmosphere of learning and learning together (Aspi & Syahrani, 2022; Kurniawati, 2022; Mawati et al., 2023). Students can experience changes in understanding, behavior, and reason to survive and relate to others. Teachers have an important task in the world of education. Because the teacher has the main authority in the classroom to guide students through the learning process. Teachers need to have skills to support their work, including producing quality graduates. The quality of existing education will affect human resources and progress for the Nation. To obtain a quality education, it takes good ability from teachers. Teachers are required to have 4 main competencies in educating and guiding their students (Kirana, 2011). To achieve these 4 potentials, of course, prospective teachers need to be well prepared.

UPH Faculty of Education is a faculty that provides teacher graduates with the study program taken. FIP UPH has a mandatory program that must be taken by students. The program is a Field Experience Program (PPL) taken 2 times in 4 years of study. PPL 1 is given so that students can learn and observe teachers at school. Here students can learn directly at school and observe the learning process carried out by the teacher. Next is PPL 2 which is taken before students compile the Final Project. In PPL 2 students will teach directly at school. Students will practice the knowledge learned during lectures and are invited to learn with students in schools according to their fields. There are many things that students can certainly learn while taking this practical program.

Based on interviews with students, students admitted that the job of being a teacher is not easy. Teachers not only teach in class, but teachers have the responsibility to guide students, show examples for students, and guide students' character to be good. In addition, teachers also need to complete quite a lot of school administration, starting from preparing the RPP / Unit Plan, making teaching materials, making power points, and being active in activities at school outside of class hours. This quite heavy task makes some students begin to think about whether the job of being a teacher is a suitable job for them.

Students of the Mathematics Education Study Program experienced this struggle. When he made observations, he saw that the mathematics teacher he observed made more effort to try to make his students understand the material taught. As it is known that mathematics is a subject that students fear and even avoid (Hidayah & Maemonah, 2022). Students experience anxiety when learning mathematics. This fear makes students reluctant to pay attention to mathematics and results in less-than-optimal grades obtained by students. Mathematics teachers have a tough task because they must give confidence to students and introduce mathematics into a fun lesson. Mathematics teachers need to be creative in providing teaching so that students can easily understand the material taught. Mathematics teachers also need to study the content of mathematics content well to avoid misconceptions of the material. In addition, mathematics teachers must also upgrade their abilities, attend training, and update technological developments.

The challenges of mathematics teachers in conducting mathematics learning have made some UPH FIP students worry about their ability to practice teaching. This can have an impact on their interest in becoming teachers. Interest makes a person have encouragement and pleasure

for the job he wants (Yulianto & Khafid, 2016). Internship is the estuary of all educational programs that are lived throughout their learning years (Wicaksono & Darmawan, 2015).

All activities, both held in the form of lectures, practices, and independent activities, are directed to the formation of teaching skills, which are scheduled, and systematically fostered in this PPL. Then in the implementation of teaching practices in PPL activities, students are expected to gain sufficient teaching experience to support students' readiness to become educators. According to Mardiyono in (Yulianto & Khafid, 2016) For every teacher candidate education, it is necessary to hold teacher practices packaged in Field Experience Practice (PPL)". An internship is expected to prepare prospective teachers to be successful in teacher competency tests. Field Experience Practice is a series of activities programmed for prospective teacher students which include teaching exercises and non-teaching exercises as a place to form and foster professional competencies required by teacher work or other education (Hapsari & Widhianningrum, 2016).

Seeing that PPL is an activity that provides many benefits, PPL is a mandatory program given to students of the UPH FIP Mathematics Education study program. The experience gained by students can provide insight and encouragement for students, especially in students' interest in becoming teachers. Interest is a sense of preference and a sense of interest in something or activity without anyone telling you to (Djaali, 2013). With interest, students will be serious in learning teacher theory and in the end, will be ready to carry out their duties as teachers. Students who have more interest in becoming teachers will be better prepared to become teachers compared to other students whose interest is low or even have no interest in becoming teachers (Kholifah & Hadi, 2017; Ulin & Oktarina, 2014). The results showed that the practice of field experience, interest in becoming a teacher, and learning achievement had an effect both partially and simultaneously on readiness to become a professional teacher (Yulianto & Khafid, 2016). The results of other studies also showed that PPL influenced the interest in becoming a teacher at a university in Tanjungpura Pontianak (Simamora et al., 2018).

With a different learning context, the purpose of this study is to see the influence of PPL on students' interest in becoming teachers for UPH FIP Mathematics Education students. Whether the PPL that has been done by students shows good interest or even vice versa. FIP UPH students are students who received scholarships from the foundation during their studies. In addition, students who graduate will receive official ties by working in foundation schools or even outside foundations that collaborate with Faculties/Foundations. Thus, the results of this research can be useful as a reference for Study Programs to obtain their work placement locations after studying. So that the benefits for the study program and students can be felt. Faculty can also provide briefing with various seminars to further strengthen students' vocation or interest in becoming teachers.

Research Methodology

This type of research is quantitative research while data analysis uses statistical procedures with the help of SPSS. The population in this study is students of the Mathematics Education study program class of 2021 who have gained PPL experience at the Faculty of Education, Universitas Pelita Harapan with a total of 16 students. While the sampling technique used in this study is *purposive* sampling (Lenaini, 2021) where students of the Mathematics Education Study Program class of 2021 were used in this study. This is intended because it is specifically for students of the UPH FIP Mathematics Education study program. Data

collection method using questionnaires. Questionnaires are used to measure variables of self-concept and interest in becoming a teacher. The data analysis method uses validity tests, reliability tests, normality tests, descriptive statistical analysis, linear regression analysis, and determining the coefficient of determination.

The following is Table 1 about questionnaire grids to measure students' self-concept. The questionnaire used was adopted from a study conducted by (Nurlatifah, 2014).

Table 1. *Student Self-Concept Questionnaire Grid*

Variable	Indicator	Sub Indicator	Question Item Number	Total
Self-concept	Identity self	- Understanding yourself - Understand your abilities and talents	1,2,3,4,5	5
	Behavioral self	- Designing self-schematics - Decision	6,7,8,9	4
	Judging self	- Conduct a self-evaluation. - Make a change	10,11,12,13	4
	Physical self	- Understand his physical state	14,15	2
	Moral-Ethical self	- Have good ethics and morals	16,17	2
	Personal self	- Understand yourself physically or in a personal attitude. - Have confidence	18,19,20	3
	Family self	- Always have parental support and encouragement	21,22,23	3
	Social self	- Able to interact and adapt. - Favorable environmental conditions	24,25,26,27	4
Total				27

Meanwhile, the following is Table 2, which contains a grid of student questionnaires regarding interest in becoming a teacher. The questionnaire used is a modification of the results of the research conducted by (Nurlatifah, 2014).

Table 2. *Student Learning Interest Grid*

Indicator	Sub Indicator	Question Item Number	Number of Questions
Feeling Happy	- Feeling good when teaching - Enthusiasm for obtaining educational knowledge	9,12 10,13,15,16,17	7
Attention	- Information about education - Views on teachers	1, 2 7,8	4
Interest	- Interest in becoming a teacher	3,4,5,6,11	5
Motivation	- Reasons to want to be a teacher	14,18,19,20	4

The following are the categories used to see the level of self-concept and interest in becoming a teacher based on the scores obtained after filling out the questionnaire (Simamora et al., 2018).

Table 3. *Categories Self-Concept and Interest in becoming a teacher*

Category	Criteria	Score Interval	Self-concept		Interest in becoming a teacher	
			Freq	%	Frequency	%
High	$X \geq (M + SD)$	$X \geq 94,04$	3	18,75		
Middle	$(M - SD) \leq X < (M + SD)$	$75,34 \leq X < 94,04$	11	68,75	7	44
Low	$X < (M - SD)$	$X < 75,34$	2	12.5	11	56
Total			16	100		100

Results and Discussion

Results

The research was conducted in the Mathematics Education Study Program at a private university in Tangerang, Indonesia. One of the courses that must be studied by students is an internship program where students make observations at school by looking at teachers while teaching. This can provide an overview for students of how conditions are in the classroom, the procedures given even in arranging administration at school. The variable studied here is the self-concept of students with student interest in becoming teachers. Because students of the Mathematics Education study program are expected to produce graduates who become teachers. The subjects of the research conducted were 16 students where the internship places were spread across several different schools with different characteristics.

The following table shows the value of descriptive statistics of students regarding variables of self-concept and student interest in becoming teachers.

Table 4. *Descriptive Statistics*

	N	Minimum	Maximum	Sum	Mean	Std. Deviation	Variance
Self-concept	16	66	100	1355	84.69	9.350	87.429
Interest become a teacher	16	60.00	93.75	1188.75	74.2969	8.58740	73.743
Valid N (listwise)	16						

The average self-concept of students is 84.69 which means that the student's self-concept is included in the medium category. While the interest in becoming a teacher shows the average generated is 74.3 which means that the interest in becoming a teacher is included in the low category. The resulting standard deviation on students' self-concept is 9.35 while the standard deviation on interest in becoming a teacher is 8.59 which means the data is quite varied.

Self-Concept and Interest in Being a Teacher

Self-concept data is obtained from the scores of questionnaire data processing that have been filled in by students. The following is the total score obtained by each student and their categories.

Table 5. *Student Self-Concept*

Student	Student Self-Concept		Interest in becoming a teacher	
	Score	Category	Score	Category
1	82	Middle	71.25	Low
2	89	Middle	72.5	Low
3	72	Low	60	Low
4	98	High	86.25	Middle
5	85	Middle	77.5	Middle
6	94	Middle	77.5	Middle
7	83	Middle	68.75	Low
8	83	Middle	70	Low
9	100	High	93.75	Middle
10	88	Middle	66.25	Low
11	87	Middle	78.75	Middle
12	66	Low	77.5	Middle
13	95	High	83.75	Middle
14	78	Middle	70	Low
15	78	Middle	68.75	Low
16	77	Middle	66.25	Low

Figure 1. *Percentage of Self Concept and Interest become Teachers*
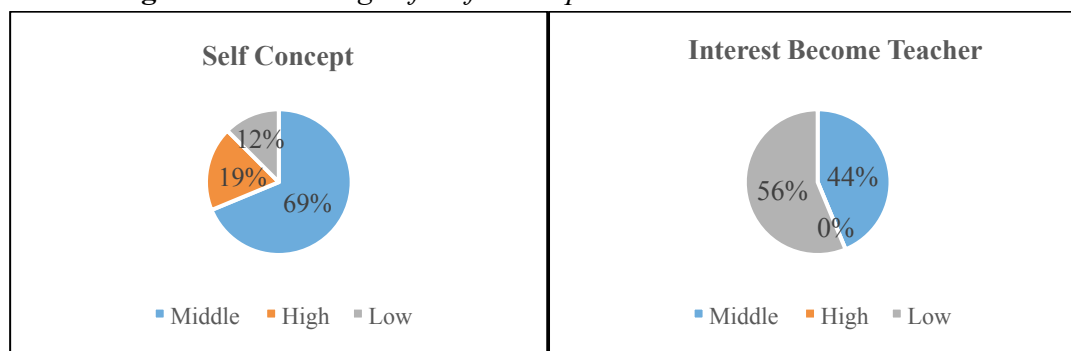
In Figure 1. There are 69% of students or 11 students have a medium self-concept, 19% of students or 3 students have a high self-concept and 12% of students or 2 students have a low self-concept.

Data on interest in becoming a teacher were also obtained using questionnaires. From the diagram, the circle shows that 56% of students or 11 students have low interest while 44% or 7 students have moderate interest. At least in this class, none of them have high interest.

Table 6. *Percentage of Self-Concept and Interest in Becoming a Teacher Based on Each Indicator*

Variable	Indicator	Average Per Indicator
Self-concept	Identity self	73,63
	Behavioral self	67,97
	Judging self	80,86
	Physical self	75,56
	Moral-Ethical self	81,67
	Personal self	83,33
	Family self	85
	Social self	80,86
Interest in becoming a teacher	Feeling happy	73,66
	Attention	85,55
	Interest	75,63
	Motivation and drive	62,5

The results of the self-concept questionnaire show that the highest indicator here is personal self while the lowest is the behavioral self-indicator. While in the variable of interest in becoming a teacher, the highest indicator is attention and the lowest is motivation and drive.

Normality Test

This test is conducted to determine whether self-concept variables affect students' interest in becoming normally distributed teachers or not. Normality test using Kolmogorov-Smirnov with the help of SPSS (Pratama &; Permatasari, 2021). The stipulation in the calculation is that if the significance level is more than 0.05 then the data is normal (Mariana & Zubaidah, 2015). The following are the results.

Table 7. *Tests of Normality*

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Self-concept	.090	16	.200[*]	.980	16	.967
Interest become Teacher	.145	16	.200[*]	.954	16	.555

[*]. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Figure 2. *Boxplot of Self Concept and Interest Become Teachers*
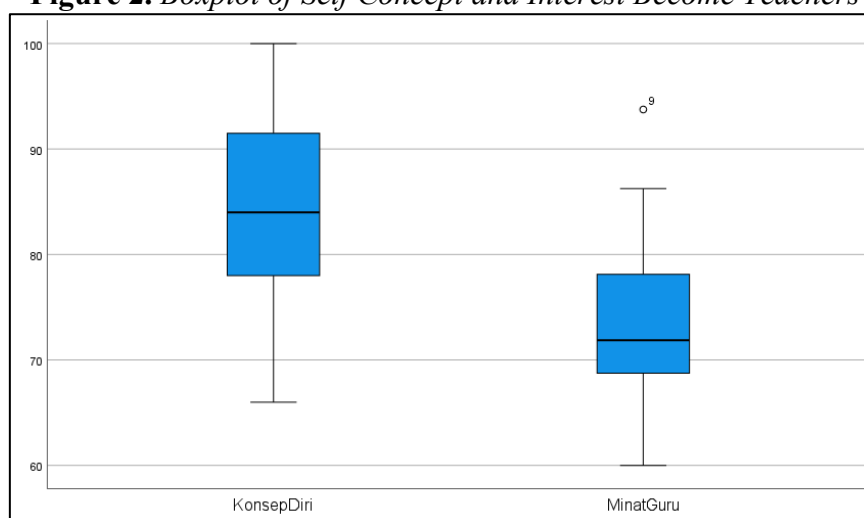
Table 7 and Figure 2 show that the data on students' self-concept and interest in becoming a teacher show normal data. This is indicated in the significance that the value is more than 0.05. In the boxplot, the data also tends to be normal, although there are outliers in the variable of interest in becoming a teacher, but it can still be said to be normal.

Linearity Test

The linearity test was conducted in this study to determine whether the two variables, namely the field experience practice variable (variable x) and the variable of interest in becoming a teacher (variable y) have a linear relationship or not by looking at the significance value if it is more than 0.05 then the two data are linearly bound and vice versa (Simamora et al., 2018). With SPSS the linearity test uses the Test for Linearity at a significance level of 0.05.

Table 8. *ANOVA*[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	531.948	1	531.948	12.970	.003[b]
	Residual	574.204	14	41.015		
	Total	1106.152	15			

a. Dependent Variable: Interest in becoming a teacher
b. Predictors: (Constant), Self-concept

In Table 8. F count obtained is 12.970 and significance obtained is 0.003 so it can be said that there is an influence between self-concept and interest in becoming a teacher.

Simple Linear Regression Test

A simple linear regression test is performed to determine the extent of the causal relationship between the dependent and independent variables. Based on the results obtained, it is known that the value of coefficients obtained is 20.361, this means that it can be interpreted that if self-concept is zero, then interest in becoming a teacher is positive 20.361. While the positive regression value of 0.637 can be interpreted as every increase of 1% in self-concept variables, it will be followed by an increase in the average variable of interest in becoming a teacher of 0.637. So, the regression equation is Y = 20.361 + 0.637X.

Table 9. *Simple Linear Regression Calculation Results*

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	20.361	15.062		1.352	.198
	Self-Concept	.637	.177	.693	3.601	.003

a. Dependent Variable: Interest Become Teachers

To calculate how much the correlation value or relationship between the practice of field experience and interest in becoming a teacher can be seen in Table 10. The magnitude of the correlation value or relationship (R) is 0.693. Based on the stipulated conditions, this figure lies between 0.60 – 0.799 which is included in the strong category.

Table 10. *Model Summary*[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.693[a]	.481	.444	6.40426

a. Predictors: (Constant), Self-concept
b. Dependent Variable: Interest become Teacher

The R value obtained is 0.693 which means there is a correlation or relationship (R) of 0.693. In addition, the R square obtained a value of 0.481 which means 48.1% or there is an influence between self-concept variables and interest in becoming a teacher.

Figure 3 shows the influence between self-concept and interest in becoming a teacher. The curve formed shows a positive influence.

Figure 3. *Histogram and Normal Q-Q Plot of Regression Standardized Residual
(Dependent Variable of Interest become Teachers)*
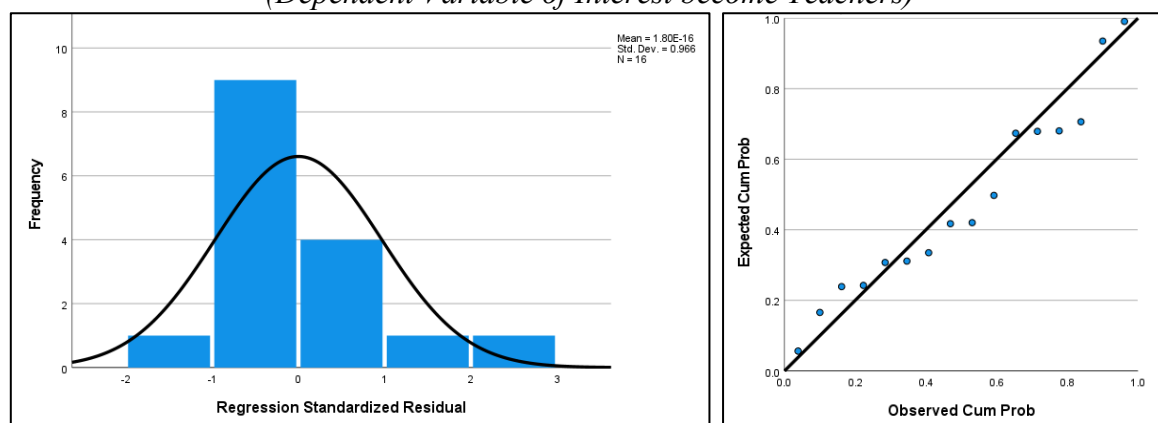
Hypothesis Test

The basis for decision making in this hypothesis test is that if the significance of $t_{counts} \leq t_{table}$ then H1 is rejected, and Ho is accepted and if the significance $t_{counts} \geq t_{table}$ then Ho is rejected and H1 is accepted. The t table value for significance 0.05/2 with degrees of freedom df = n − k or 16-2 = 14 is 2.145. While the calculated t value that can be seen in Table 9 obtained a value of 3.601. Based on existing hypothesis decision making, H1 is accepted, and Ho is rejected because $t_{counts} > t_{table}$ (3.601 > 2.145), so it can be concluded that there is a significant positive influence between self-concept on interest in becoming a teacher in mathematics education students in Indonesia.

Next to find out how much influence between the independent variable and the dependent. See Table 10. The number of R square will be converted into percent which means to find out how much the percentage of influence of the independent variable on the dependent variable. The R square value is 0.481. The magnitude of the influence of self-concept on interest in becoming a teacher in students is 0.481, meaning that the percentage of student self-concept affects interest in becoming a teacher by 48.1%, while the remaining 51.9% is influenced by other factors that were not studied in this study.

Discussion

Self-Concept

Self-concept has a significant role in determining individual behavior in viewing themselves. The benefit of knowing self-concept is that individuals are optimistic, confident, always think and behave and behave positively. The results showed that the average self-concept of students was 84.69, which means that the students' self-concept is included in the medium category. The resulting standard deviation in students' self-concept is 9.35 which means the data is quite varied. In addition, 69% of students or 11 students have a medium self-concept, 19% of students or 3 students have a high self-concept and 12% of students or 2 students have a low self-concept. The results of the self-concept questionnaire show that the highest indicator is personal self, while the lowest is the behavioral self-indicator.

Self-concept is the overall view of oneself, that is, how one sees, assesses, and responds to oneself. When someone has a wrong self-concept, the person will find it difficult to conduct the life process to achieve success. This is because the problems that arise often come from

us, the longer the problems that come from within us are not realized then it will create a series of problems that may have a fatal impact on ourselves.

Self-concept in a person is the result of the learning process that occurs from childhood to adulthood, things that affect self-concept can come from environmental factors, parenting or experiences during the life process. These factors impact the formation of a person's self-concept. The attitude of parents and the environment will be a source of information for them to know who "themselves" are. Self-concept is the basis of a person interacting or behaving with his environment (Melguizo-Ibáñez et al., 2022; Piccirllo et al., 2021; Rohmalimna et al., 2022).

In general, self-concept has two forms, namely positive self-concept and negative self-concept, here is the explanation (Widiarti, 2017):
  a. Positive self-concept
  Individuals who have a positive self-concept will tend to be more optimistic, show confidence, and always be positive about everything, even the failures experienced during the process of life. Individuals who have a positive self-concept will always respect themselves and see everything from the positive side to achieve success in every process of life. Positive self-concept is the key to success in life.
  b. Negative self-concept
  Individuals who have a negative self-concept will always look at and believe that they are weak, helpless, unable to do anything, incompetent, failed, unattractive, disliked, and other negative thoughts in looking at themselves. This individual will tend to be pessimistic or easily discouraged about life and the opportunities he faces, seeing challenges as obstacles or obstacles not as opportunities that must be faced and conquered.

Individuals who have a negative self-concept will easily give up and despair when they find a little obstacle in each process, will always be overshadowed by the fear of failure, and usually, if they experience failure will blame themselves excessively on others.

In forming a self-concept, several components must be owned to form a complete self-concept, these 3 components (Basiroh & Suyato, 2020) It consist of self-ideal, self-image, and self-esteem. 1. Ideal Self: the figure of a person who is judged perfectly and admired and coveted and who wants to be imitated to become an ideal self-model for the individual. 2. Self-image: Self-image is a way of seeing ourselves and judging ourselves in that moment. Always think positively then we will always be positive in every aspect of life.3. Self-esteem: The higher one's self-esteem, self-acceptance, and respect for oneself as someone valuable and meaningful, the higher one's self-esteem.

As for the factors that can affect a person's self-concept (Asri & Sunarto, 2020), These include parenting, failure, depression, and internal criticism.

Here are steps that need to be taken to have a positive self-concept: 1) Be objective in recognizing yourself, 2) Respect yourself, 3) Do not be hostile to yourself, 4) Think positive and rational. So, how important is self-concept in increasing learning motivation? The answer must be particularly important, talking about self-concept is never separated from a confident and optimistic attitude.

Interest in Becoming a Teacher

The results of research on the variable of interest in becoming a teacher were conducted in the medium and low categories with the average produced being 74.3 which means that interest in becoming a teacher is included in the low category. The resulting standard deviation of interest in becoming a teacher is 8.59 which means the data is quite varied. Data on interest in becoming a teacher were also obtained using questionnaires. From the pie chart, it shows that 56% of students or 11 students have low interest while 44% or 7 students have moderate interest. While in class no one has a high interest. The variable of interest in becoming a teacher indicator is highest is attention and the lowest is motivation and drive. This means that students are less interested in becoming teachers because of lack of motivation and encouragement in themselves. It can be said that after students make observations in class, it turns out that students are less interested in becoming teachers.

The students studied have diverse backgrounds spread from various regions in Indonesia.

Figure 4. *Dissemination of Student Regional Origin*
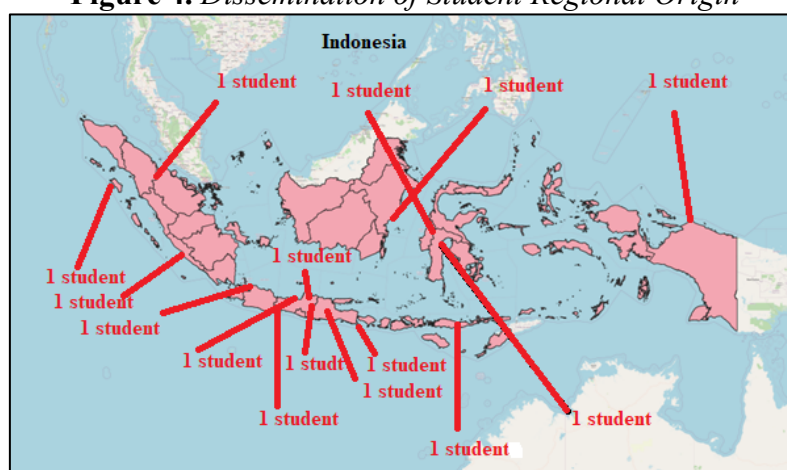
Students who study have different ethnicities and divergent backgrounds. Some backgrounds because parents become teachers so that they recommend and provide full support for their children to become teachers. In addition, there are also those who have a background of pastor children, farmer children and various kinds of jobs. So, this can also be a factor that influences students' interest in becoming teachers. In addition, students have also seen for themselves how difficult it is to be a teacher. The task of the teacher is not only to teach but also to complete administration and educate students to have good character. This resulted in the influence of self-concept by 48.1%, the rest was from other factors.

Conclusion

Based on the results of the research that has been done, it can be concluded as follows: Student self-concept is categorized as medium, with a percentage of 84.69%. This figure is in the medium category (80.1%-100%). The interest in becoming a teacher in mathematics education students in this study can be categorized as low, with a percentage of 74.29%. This can be seen from the results of the questionnaire consisting of 4 indicators, namely feelings of pleasure, interest, attention, and motivation. Students are less interested in becoming teachers because of the moderate self-concept factor of 48.1% and 51.9% due to other factors.

Based on the results of the research and conclusions, the researcher provides several suggestions, namely: (1) For mathematics education study programs, should be able to improve students' self-concept by providing support and enthusiasm to fulfill their vocation as prospective teachers. So that the self-concept of moderate students can be high. (2) Students should be serious and maximal in implementing PPL so that useful experience is obtained for students. For students who want to enter the Faculty of Education, Mathematics Education needs to have an interest as a teacher because graduates are expected to become teachers. (3) Further researchers should examine other variables that can influence such as environmental factors, parents, information about the world of work and oneself (willpower).

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Perspectives and Practices of Middle Managers of Their Competencies:
Basis for a Sustainable Competency Building Program

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Abstract
The recurring theme of higher educational institutions in the Philippines is to compete in a competitive global and international market of higher education. To accord with the challenges and demands in higher educational institutions, the role of middle managers is deemed important. This study aimed to determine the relationship between the perspectives and practices of middle managers' competencies. The total population sampling and stratified sampling methods were employed in the selection of middle managers and subordinates as respondents and participants in this study. In this study integration of Quan-Qual results was made through the use of the joint display method, a researcher made questionnaire was developed and a Convergent Parallel model was utilized. The results provided insights to develop a sustainable competency-building program for middle managers in higher educational institutions.

Keywords: Middle Managers, Perspectives, Practices, Competencies, Higher Education

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1. Introduction

Management is about ideas, people and resources. It is about making the best of the resources one has and maximizing staff potential, equipment, time, money and space. The organization in the academe consists of three levels of managers; these are top managers, middle managers, and first line managers and non-management who work together aimed towards the achievement of a goal.

Middle management is a vital position with a distinctive role. They are entrusted with important work that no one else can do. They think about the bigger picture and work in accordance to achieve optimal productivity. However, not all middle managers possess all the aforementioned capabilities, perspectives and practices to effectively carry out their responsibilities in the organizations they belong to because of lack of experience in decision-making as well as in planning and organization. In view of the aforementioned, many of the said ideas about the problems of academic middle managers' that is highly emphasized on the significance of middle managers' managerial competencies, abilities, leadership, management role and responsibilities and leadership training programs which are meant to help middle managers' address their professional shortcomings and concerns.

This study is premised on Management Competency Theory of Silva (2016) about competencies in management. According to Silva (2016) one must look ahead on the impact it may take on the organization while various aspects of management and leadership behaviour termed competencies in organization are contemporarily needed to bring optimum work performance. Guided by the theory, the researcher sensed the necessity to look into the competencies and relation practices of the middle managers in the academe. It explains that to make a standard work, it is important to possess the right skills and performance of middle managers that align with the organization's strategic direction, provide an impact and affect everyone in the organization. It helps the organization achieve good results and maintain its desired culture. The executive or top managers must understand how they will contribute to the organization's strategic positions and goals of what is expected from the middle managers, and how they are doing as it focuses on the growth and development of both organization and their subordinate.

The Independent Variable-Dependent Variable model was used as the conceptual framework of this study. The IV-DV model was deemed suitable for the purpose of the study since it aims to determine the relationship between the perspectives and practices of middle managers' competencies. The study considered also the Intervening Variables which consists the demographic criteria of the respondents such as age, sex, academic rank, designation/appointed position, number of years of teaching experience and highest educational attainment. The results would be the basis to undertake a development process which requires an analysis of the organization's needs as well as the design and development of a sustainable competency-building program to address the identified needs.

Independent Variable   **Dependent Variable**

Perspectives of Middle Managers' Competencies
• Advocacy • Communication skills • Financial skills • Self-leadership • Problem management and resolution

Practices of Middle Managers' Competencies Communication
• Communication • Decision making • Negotiations • Task management

Intervening Variable

Profile of Respondents
• Age • Sex • Academic rank • Designation/Appointed position • Number of years of teaching experience • Highest educational attainment

Figure 1: The Conceptual Model of the Study

The main concern of the study was to determine the relationship between the perspectives and practices of middle manager's competencies. In particular, the first statement of the problem is (1) What is the profile of the middle managers' based on the following criteria: Age; Sex; Academic Rank; Designated position; Number of years of teaching experience; and Educational qualification? (2) How may the perspectives of middle managers' and their subordinate on their competencies be determined in terms of the following domains such as: 1) advocacy; 2) communication skills; 3) financial skills; 4) self-leadership; and 5) problem management and resolution? (3) What are the practices of the middle managers' competencies in terms of the following indicators: 1) communication; 2) decision making; 3) negotiations; 4) task management; and 5) empowerment? (4) Is there a significant difference between the perspectives and practices of the middle managers' competencies? and (5) What are the perspectives of the middle managers' and subordinates on their competencies as extracted from focus group discussions in terms of the following domain: 1) advocacy; 2) communication skills; 3) financial skills; 4) self-leadership; and 5) problem management and resolution?

2. Method

The Convergent Parallel model, a mixed method in triangulation design was utilized for this study. A convergent parallel design entails that the researcher concurrently conducts the quantitative and qualitative in the same phase of the research process. This design includes quantitative and qualitative research design in order to expand and strengthen the findings and conclusion of the researcher about middle manager's perspective and practices of their competencies. Furthermore, this convergence mixed method research involves collecting and

analyzing quantitative and qualitative data separately on the same phenomenon and then the different results are converged by means of comparing and contrasting during the interpretation. The researcher of this study want to validate and confirm quantitative results with qualitative findings on perspectives and practices of middle managers' of their managerial competencies of state universities and colleges because the researcher will rely on the quality of data gathered in preparing a sustainable competency-building program for middle managers' that will be used by the different HEIs to mentor and guide middle managers in preparation to become leader in the academe or be part of the executive officials of their respective institution.

Because of the nature of the study involved, total population sampling and stratified sampling methods were employed in the selection of middle managers and subordinates as respondents and participants in this study. Respondents will be identified during the pre-survey conducted by the researcher. Pre-survey was conducted in order to determine the number of middle managers' and subordinates as target participants/respondents of this study. The basis of selection criteria for respondents and participants has been identified by the researcher through the survey of the different CHED Memorandum Order for Policies, Standards and Guidelines of the program/ unit.

Table 1: Respondents of the Study

State Universities and Colleges	Middle Managers'		Subordinate	
	Total Population	Sample	Total Population	Sample
SUCs A.	42	42	210	81
SUCs B.	10	9	51	10
SUCs C.	10	10	49	10
SUCs D.	33	31	165	66
Total	**95**	**92**	**475**	**167**

The data-gathering procedure of this study will be conducted with utmost consideration to the privacy of the respondents. Permission to conduct the study in the SUCs will be sought through written correspondence with the university administrators. As for the respondents/participants, their participation will be oriented about the study and their consent sought before they take part in it. They will be asked to sign a written consent before they participate in the survey, interview and focus group discussion. In order to ensure the confidentiality and liabilities of the participants and respondents to this study, the following steps will be observed: (1) any information collected from you during your participation in this survey will be anonymous. You will not be identified as no name/s are required for participation in this study, and all identifying information will be de-identified in the recording and interpretation process. The data and information collected will only be accessed by the researcher. (2) Participation in this study is on a voluntary basis, even if you decided to participate in the survey, you may withdraw anytime. No adverse action will be taken against you for withdrawing your participation as respondents. Any information that you may not wish to reveal will be highly observed by the researcher. If you wish to terminate your participation in this study, please inform the researcher immediately, so that your responses can be separated and destroyed right at that point. During the data gathering, the respondents/participants are given the prerogative to refrain from answering questions

and their request for this will be granted and respected. All the data that will be gathered from the informants will be treated with the utmost confidentiality. Furthermore, the researcher will ensure the protection of the participants' identities and rights in accordance with the Data Privacy Act of 2012.

3. Results and Discussion

3.1. Statement of the Problem 1

More than half of the respondents were 40 – 49 years old; almost two-thirds are male respondents. And the academics ranks of the respondents were almost equally distributed from instructors, assistant professor to Associate Professor. Almost all of the respondents handling the position of department/program chair. Furthermore, more than half of the respondents have been teaching for more than ten (10) years.

3.2. Statement of the Problem 2

On the perspectives of the middle managers and their subordinates on the competencies of the former have the highest level of agreement in each of the domains:

- In terms of ADVOCACY – The middle managers advocate on behalf of individuals and support networks to address their needs, expectations and priorities.
- In terms of COMMUNICATION SKILLS – In giving feedback, the middle managers foster self-improvement and constructive criticism rather than defensiveness or anger.
- In terms of FINANCIAL SKILLS – The middle managers listen openly and attentively to others when they share ideas about financial parameters.
- In terms of SELF-LEADERSHIP – The middle manager fulfills his/her responsibilities and commitments and demonstrates professionalism and responsibility, and
- In terms of PROBLEM MANAGEMENT AND RESOLUTION – The middle manager practices proactiveness in both opportunities and problems.

3.3. Statement of the Problem 3

The following competencies of the middle managers have the highest level of practice in the following indicators:

- In terms of COMMUNICATION – the middle managers communicate effectively at all levels of university/college management.
- In terms of DECISION MAKING, the middle managers exercise flexibility.
- In terms of NEGOTIATIONS, the middle managers design programs with stakeholders to address the need of the institution.
- In terms of TASK MANAGEMENT, the middle managers have values and respect the contribution of all members to meeting the needs of the individual in the department/unit.
- In terms of EMPOWERMENT, the middle managers disseminate regular updates on different in-service training programs available for members of the academic community.

3.4. Statement of the Problem 4

The post analyses on the test of the relationship between the middle managers' perspectives and practices, the study found out that there is a significant relationship between advocacy and the communication practices of middle managers. Also between communication skills and each of the managerial practices such as communication, decision making, negotiations,

task management, and empowerment. Also between financial skills and communication practices.

On the other hand, there is no significant relationship between self-leadership and each of the managerial practices such as communication, decision making, negotiations, task management, and empowerment among the middle managers.

3.5. Statement of the Problem 5

During the focus group discussions, the following were observed: From the responses of the participants of focus group discussion, quality accomplishment and activities of empowerment was the theme developed for advocacy. For communication skills openness and fairness and activities of giving periodic feedback as theme developed from the responses of the participants. It can be also deduced from the data that only the middle manager has a direct involvement on financial skills domain and the subordinates have no participation. Likewise, the data construe that middle manager prepares the annual budget plan to meet the department/unit objectives and targets. Also, professionalism and authority with respect are the theme developed from the responses of participants. The middle manager demonstrates good leadership to his/her subordinates. Additionally, the middle manager addresses complaints especially on faculty loading as commonly faced by his/her unit.

4. Conclusion

Based on the significant findings of the study, the following were concluded:
1. Majority or most of the middle manager respondents were 40 – 49 years old, male, with the academic rank of Instructor handling the position of Department/Program Chair, and have been teaching for more than ten years.
2. The respondents agree on the middle managers' competencies in terms of communication skills and self-leadership, but they slightly agree in terms of advocacy, financial skills, and problem management and resolution competencies.
3. The middle managers assessed themselves that they moderately practiced the following competencies such as communication, decision-making, negotiation, task management, and empowerment.
4. It was found that the middle managers had the same views and assessments on their perspectives and practices when grouped according to the number of years in teaching experience, while the rest of the profile had shown significantly different.
5. It was found that the advocacy, communications skills, and financial skills of the middle managers were related with their managerial practices.
6. From the focus group discussion of middle managers and subordinates, the participants developed themes about on the perspectives of middle managers of their competencies. Middle managers produce quality accomplishment and exhibit good leadership through openness and fairness. It also enumerates the activities of middle managers in terms of empowerment and giving feedback of their performance. Furthermore, the focus group discussion also mentioned the common problems in the department are frequent complaint against the subordinates and uneven distribution of faculty loading.
7. The developed sustainable competency-building program for middle managers serve as a guide and template to conduct seminar and training for the middle managers and faculty to enhance their competencies on school governance and management.
8. This study is anchored on Management Competency Theory of Silva (2014) about competencies in management. The Management Competency Theory of Silva (2014)

states that in order "to provide standard work, it is necessary to possess the right skills and knowledge of the ground rules of the task at hand. Likewise, integrity and commitment and a sense of responsibility are essential for managers that this might help improve employee's performance in attaining all the outstanding goals" Based from the findings of the study middle managers' perspectives of their competencies agree in terms of communication skills and self-leadership, but they slightly agree in terms of advocacy, financial skills, and problem management and resolution competencies. Furthermore, the middle managers assessed themselves that they moderately practiced the following competencies such as communication, decision-making, negotiation, task management, and empowerment, these assessment is further supported by the findings of the focus group discussion. The theory of Management Competency Theory of Silva (2014) is proven by this present study that the communication skills, self-leadership, advocacy, financial skills, problem management and resolution, communication, decision-making, negotiation, task management, and empowerment are the right skills of the middle managers to attain the target goals of the institution.

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The Impact of Student-Versus Teacher Led Error Correction in the EFL Classroom: Validity and Reliability Considerations

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Abstract

Corrective Feedback (CF), defined by Lightbown and Spada (1999) as, 'Any indication to the learners that their use of the target language was incorrect', can be classified as being either teacher- or student-led. Empirical evidence suggests that student-led correction is more effective (Lyster and Ranta, 1997); however, it has been found that teacher-led correction is the most commonly used (Pawlack, 2014). The objective of these interventions is to establish the comparable efficacy and perceived effectiveness of the two forms of error correction with students in a Japanese senior high school and to ascertain their views on appropriate error correction (EC) methods. To do this, a series of tests were designed to gauge students' emerging grammatical accuracy in both oral and written communication. In order to guage students' perceptions of the efficacy of the error correction methods, a short survey was administered at the end of the testing stage. Before beginning the large-scale main trial, an external pilot study was conducted to validate the feasibility of the planned research. The current paper notes the considerations involved in the study, as well as its limitations. It then moves on to detail the modifications that were made to the instruments, the testing procedures and other data collection instruments which increased the validity and reliability of the proposed quasi-experimental study. At the conclusion of the pilot, it was found that the full study could proceed.

Keywords: Error Correction, Pilot, Validity, Reliability, Instrument, Procedure

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Introduction

The importance of error correction (E.C.) was described by Lee (2017: 582), who asserts that it can, 'play a critical role in eliminating [learner] errors.' Lyster and Saito state that E.C. has 'significant and durable effects on target language development' (2010: 266). The significance of grammatical accuracy was highlighted by Edge (1997), who writes that successful communication can depend on it.

The value of EC can also be located in student expectations. Fukuda (2004) found that students wanted more error correction than their teachers believed was necessary. Dornyei and Ryan (cited in Kartchava, 2016: 19) describe learner beliefs as, 'significant learner characteristics to take into account when explaining learning outcomes'.

In his work on E.C., Hendrickson (1978) posed the question of who should be responsible for error correction. Support for student-led approaches has come from a number of researchers (see, for example, Harmer, 1991; Bartram and Walton, 1991 and Edge, 1997). However, this conclusion is not universally accepted (see for example, Miao, Badger and Zhen, 2006; Conor and Asenavage, 1994; and Paulus, 1999).

In order to explore the impact of the different error correction methods, a study among senior high school students shall be conducted. Prior to the full-scale main trial, a pilot study was undertaken. This paper presents the results of the pilot and it discusses the importance of pilot studies in the research process in general.

Significance of the Study

Pilot studies allow researchers to assess the validity and reliability of the instrumentation and to make any necessary alterations to the procedures. Doody and Doody (2015) assert that a good pilot study will ensure methodological rigour and can lead to higher quality research and scientifically valid work. Malmqvist et al state that they are a crucial part of the research process.

In spite of their importance, however, Fraser et al (2018) note that there is a lack of published studies on the conduct of pilot studies. The authors state that it would be beneficial if more attention were given to them. This paper, therefore, will help to remedy this deficit.

Structure of the Study

First, there shall be an overview of the proposed study, which will include a literature review, the research questions, and details of the site, sample and intervention. This will be followed by a brief discussion of pilot studies and their role in the research process. The paper will move on to describe the pilot conducted prior to the proposed full-scale main trial. This section shall include details on the sample, the instrumentation and procedures, the results of the item analysis and some initial findings on the impact of the different correction methods. To conclude, the conditions under which the full-scale main trial can proceed shall be presented.

Literature Review

Error correction is, according to Ellis (2006), a form of negative feedback. It was defined by Lightbown and Spada (2017: 216) as, 'Any indication to the learners that their use of the target language was incorrect'. Russell (2009), writes that although E.C. remains a contentious issue in second language learning, it is now generally accepted to play an important role in improving learner outcomes (see also, for example, Li, 2010 and Russell and Spada, 2006).

In his review on the theory and practice of error correction, Hendrickson (1978) questioned the dominant assumption among teachers that it was their responsibility to correct learner errors, writing that peer correction might be more effective in developing the grammatical accuracy of learners. However, it should be noted that the author posited this in relation to written work. With regards to spoken errors, the he felt that the impact of peer correction would be limited to lexical errors.

Edge advocates a student-led approach to error correction. He writes that the advantage of self-correction is that it is easier to remember because, 'someone has put something right in his or her own head' (1997: 24). According to the author, the advantages of peer correction are: it involves learners in listening to and thinking about language; students become less dependent on teachers; and finally, students will be better able to assist each other during pair and group work.

Bartram and Walton (1991) also call for a student-led approach to error correction. The authors state it has four advantages, which can be located within more general discussions on the value of active learning (AL). The authors state that learners will feel more involved; they will learn to be more independent; there will be a greater feeling of cooperation; and finally, it will reduce the amount of time that the teacher spends talking.

The value of active learning is supported by Michael (2006), who asserts that available research supports the effectiveness of a student-centered active pedagogy. The author ascribes this to the positive effect of learners explaining their reasoning to themselves, their peers or to their teachers. In terms of how this should be applied, Michael writes that teachers should, 'reform [their] teaching, employing those particular approaches to fostering active learning that match the needs of [their] students, [their] particular courses, and [their] own teaching styles' (2006: 165).

Thinking of the impact of active learning in EFL and ESL, Caine (2020) states that it has been 'standard fare' for many years. The author notes that in the context of Japan, the Ministry of Culture, Sports, Science and Technology (MEXT) has been explicitly using the term in relation to educational reform at both high school and university level since 2014.

With regards to error correction methods, empirical evidence suggests that a more active approach leads to better results. Lyster and Ranta (1997) looked at the uptake rates of different error correction methods. The methods associated with a student-led approach (elicitation, clarification request and repetition) led to higher rates of uptake than teacher-led approaches: recasts and explicit correction. In response to their research question, 'What combinations of corrective feedback and learner uptake constitute the negotiation of form?' (1997:56), Lyster and Ranta concluded it was student-generated repair that was the most effective. Further, the authors assert that, 'elicitation and metalinguistic feedback proved to

be particularly powerful ways of encouraging repairs that involve more than a student's repetition of the teacher's utterance' (1997: 56).

The value of student-led correction is not, however, universally accepted. Miao, Badger and Zhen (2006) conducted a comparative study on the impact of peer and teacher correction on students' writing. The authors found that, while peer correction did have a positive role to play, teacher correction was more likely to be taken up by students and it would also lead to greater improvement. Similar results were obtained by Paulus (1999) and Conor and Asenavage (1994). Conor and Asenavage found that only 5% of peer feedback resulted in change. It is, of course, important to point out that these findings pertain to the impact of feedback for written as opposed to oral errors.

As noted in the introduction, students' beliefs are an important determinant of the success of a given approach and a number of studies support the adoption of a student-centered approach to E.C. In her study of Japanese as a foreign language class in Sydney, Yoshida, (2008) found that, in general, learners preferred to have the opportunity to think about their own errors before being given the correct form by recast. A study by Katayama (2007), which looked at learners' perceptions of oral error correction, found that the most favoured method was for teachers to indicate that a mistake had been made which would enable the student to self-correct.

A more nuanced picture of error correction emerges from a study conducted by Zembytska et al (2022). The authors assert that the choice of error correction method and corrector will depend on the proficiency level of the students. When investigating students' opinions on which E.C. method would be most likely to have the strongest preventive effect, subjects were required to indicate their proficiency level. The results, which are presented in the table opposite, suggest that more proficient students have a preference for teacher-led techniques, while student-led techniques are favoured by less proficient learners.
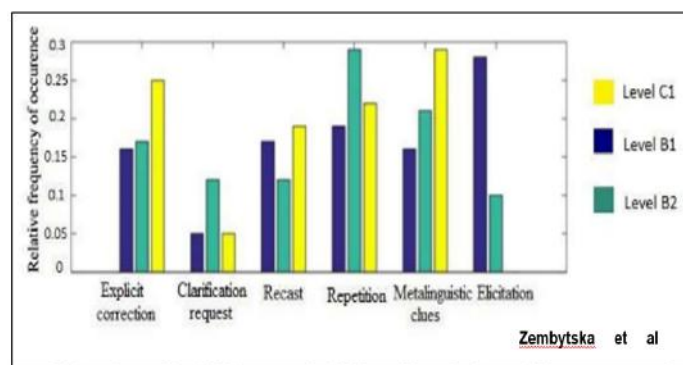
Figure 1: An analysis of students' preferences regarding the choice of corrector

Proposed Study – Outline

Objective

The objective of this study is to test whether a more active approach to error correction will lead to better short and medium-term outcomes in terms of Japanese high school students' grammatical accuracy, specifically with regards to their use of modals. Additionally, students' attitudes to teacher and student-led error correction will also be investigated.

Research Questions

The four research questions that the paper shall answer are:
1. Does error correction have a significant impact on students' grammatical accuracy?
2. Is there a significant difference between the effects of student and teacher led correction?
3. Do students want to have their errors corrected?
4. Which form of error correction do they prefer?

Site and Sample

The site where the study will be conducted is a private senior high school in Tokyo. The school is part of an escalator system. According to NIER (undated), in the escalator system 'a school corporation' will provide education from pre-school all the way through to university.

In terms of the sample, participants will be grade 2 students. They are between 16 and 17 years old, and their level – using the CEFR as a frame of reference – tends to be around A2 or B1. The sample size will be 90, divided into six groups. Groups of students will be randomly assigned to the different treatment methods: two each for the student and teacher-led correction groups and two groups acting as the control. Intact classes will be used. Burden (2011: 80) writes that, although the results might be less generalizable they provide 'authentic learning environments'. The author also asserts that fully randomized experimental designs often suffer from a lack of 'ecological validity' because of the inauthentic environments in which such studies are conducted.

Intervention

The language focus will be on students' use – both oral and written – of the following modals: must / must not, have to / don't have to, and can / cannot. Allowed to and not allowed to have also been included. While these are not modals, they are in the students' textbook in the unit covering this grammar point.

The techniques that shall be used are student and teacher-led correction. Techniques commonly associated with teacher-led correction are recasts, explicit correction and metalinguistic feedback. Those associated with student-led correction are repetition, clarification requests and elicitation. Error correction for oral mistakes will be either immediate or delayed depending on the activity with which students are engaged. Pawlack (2014) writes that the timing of the corrective move will depend on whether the activity is fluency orientated or accuracy based.

The intervention is planned to last for four weeks. A brief outline of the lessons is as follows.

Week 1 ~ must / must not
Input: Reading and listening activities from the students' textbook
      (*Time Zones, 3rd Ed. Level 3*)
Output: Writing rules for a school club using must and must not.
      Presenting rules to other groups of students.
      Discussion of the rules for the different clubs
Conclusion: Error correction, either peer or teacher led

Week 2 ~ can / cannot and allowed to / not allowed to
Input: Listening 'Life in an American school'
Output: Discuss the differences between a Japanese school and an American school
      In groups, write rules for a school
      Vote on which school they would want to attend
Conclusion: Error correction, either peer or teacher led

Week 3 ~ have to / don't have to
Input: Jigsaw reading 'Rules at home in different countries'
Output: Write a survey and question partner
      Create graphs from data and describe the results
Conclusion: Error correction, either peer or teacher led

Week 4 ~ practice and immediate post test
Output: games using modals learnt during the intervention
      Immediate post test

Instrumentation

The intervention materials consist of oral production, reading, listening and writing activities. The materials must elicit the target structure, and they have to be appropriate for the students' proficiency level and of interest to them. The materials cover all four language domains, in order to cater to both visual and auditory learners. The majority of the tasks are two-way oral interactional tasks.

The instruments for data collection are:
1. A level check to assess the homogeneity of the students
2. A record sheet to monitor the number of corrective moves made and the frequency with which this led to uptake
3. An oral picture description task
4. A gap-fill task
5. A timed grammaticality test
6. An exit survey

Methodology

The paper uses a quantitative approach. Creswell (2014) defines this as, 'an approach for testing objective theories by examining the relationship among variables. These variables, in turn, can be measured, typically on instruments, so that numbered data can be analyzed using statistical procedures.' (Creswell and Creswell, 2018: 41).

The analyses that shall be conducted are: determining the measures of central tendency to show the degree of variability in the data; a repeated measures ANOVA to determine whether there are statistically significant differences among the means of multiple groups; an independent sample t-test to assess if there is a statistically significant difference between groups; and finally, descriptive statistics to summarize the key findings of the survey.

Error Correction Pilot Study

Introduction

The Dictionary of Epidemiology (2018) describes pilot studies as, 'a small-scale test of the methods and procedures to be used on a larger scale'. A good pilot study, according to Doody and Doody (2015) will ensure methodological rigour and it can lead to higher quality research that can be published. Cohen et al (2015) assert, moreover, that where researchers are using 'a home-grown test' conducting a pilot is 'unavoidable' as it will provide the researcher with essential information on item difficulty and discriminability. In spite of the importance of pilot studies, Fraser et al (2018) write that there is a lack of published works.

The limitations of pilot studies must also, however, be borne in mind. In (2017) states that pilot studies are not suitable for testing hypotheses and the data generated in a pilot study should be treated with caution. As Dzwigol (2020) states, the information obtained from a pilot study is necessarily incomplete.

Pilot Study – Implementation

The pilot study was conducted over a period of roughly 8 months. The stages of the pilot were: planning and preparation, the intervention and data collection, data analysis, the refinement and modification of instruments and procedures, and finally report writing.

The intervention was conducted in line with the lesson outline given above. It ran for four weeks. In that time, students had four lessons, each lasting 50 minutes. The objective of the lessons was to enable students to talk and write about rules in different situations and to use appropriate language to make rules for different contexts. The error correction methods used were: elicitation, repetition and clarification requests for the student-led group, and explicit correction, recasts and meta-linguistic explanation for the teacher-led group.

In terms of the sample, a non-probability convenience sample was used. The participants were 30 grade 3 students, divided into three classes. Group 1 was the control group, group 2 the student-led group and group 3 the teacher-led group. Although the sample consisted of 3rd grade students, their level of English is sufficiently similar for them to be representative. Furthermore, they are familiar with the type of communicative activities that will be used in the intervention. Intact classes were used in order to replicate the conditions of the full-scale main trial.

Instructional Materials

The intervention materials consisted of oral production, reading, listening and writing activities. The parameters set out for judging their suitability were that the materials elicited the target structure, that they were appropriate for the students' proficiency level and that they were of interest to the students. On piloting the materials, it could be seen that these objectives were met and the materials can, therefore, be used in the main trial. Examples of the materials are presented in Appendix A.

Data Collection Instruments

Ellis (2006) writes that it is important to have a range of tests so that both the implicit and explicit knowledge of learners can be accessed. Four home-grown tests were, therefore, devised: a level check to assess the degree of homogeneity among the students, a gap fill-test, a timed grammaticality judgement test and a modals speaking task. The tests were distributed using Loilonote. The students are familiar with this application and this did not cause any problems. Additionally, measures were taken to prevent students from copying each other's work and these appear to have been generally effective.

Level Check

Students were given 15 minutes to complete the test. In the full-scale main trial, however, it is anticipated that the test will take between 8 and 10 minutes. The pilot test was a little longer so that items could be easily removed if they were found to be either too easy or too difficult.

Part 1	
1. I often (park play to the go to) football.	87%
2. I have a (allows that job work me to) with animals.	50%
3. Bill (easy-going is is the who one)	23%
4. What's (in smallest the country world the)?	46%
5. You (home at rest stay should and) tomorrow	37%

Table 1: A sample of the data from the item analysis conducted on the level check test

The results presented opposite are for part 1 of the test. The difficulty of each item was calculated using the formula $\frac{A}{N} \times 100$. 'A' refers to the number of students who answered the question correctly, while 'B' is the total number of students who attempted the item. Following Cohen et al (2015), items falling below 33% or above 67% were deemed as being either too easy or too difficult and so were discarded.

	Class -	XXXXX			
Test No.	Grammar	Vocabula	T. Marks	Total	Rounded
1	3	0	12	3	25
2	1	0	12	1	8
3	4	2	12	6	50
4	5	2	12	7	58
5	4	0	12	4	33
6	4	2	12	6	50
7	7	3	12	10	83
8	8	2	12	10	83
9	3	1	12	4	33
10	7	2	12	9	75

Table 2: Data on the division of students into high and low scoring groups

The level check allowed for the division of students into high and low scoring groups – a prerequisite to establish item discriminability – using the formula $\frac{A-B}{1/2(N)}$. The table presents data for one of the groups. As can be seen, the number of students in the high and low scoring groups is roughly equal.

Gap Fill Test

Feedback from the pilot highlighted a number of issues with the test, which would negatively impact on its validity and reliability. First, the instructions were only in English, which led to the test taking longer than it should have. Next, it was not immediately apparent what the answers should be and for some of the items more than one answer was grammatically possible. Finally, some of the students also found the title of the test to be confusing.

In the second version, instructions are in both English and Japanese. Translations were generated by DeepL Translate and were then checked by a native Japanese speaker. Additionally, in the second version, pictures were included in the left-hand column in order to more clearly show what the answer should be and to make the test more visually appealing and less intimidating. Finally, the title was changed to further reduce any confusion on the nature of the task. The tasks are presented in Appendix B.

Both discriminability and difficulty were calculated. The maximum index of discriminability is 1.00. Cohen et al (2015) assert that any items whose index of discriminability is less than 0.67 should be reviewed as the item is not sufficiently discriminating. Whether that item should still be included, however, is for the researcher to decide. A sample of the results for the item analyses is presented opposite. The questions that are marked in red did not test the target language and so results for these items did not have to be calculated.

Questions	Group 1	Group 2	Group 3	Totals	All St. Total	Disc.	Difficulty
1							
2	H = 2 M = 1 L = 0	H = 4 M = 0 L = 0	H = 2 M = 0 L = 0	H = 8 M = 0 L = 0	9	0.76%	0.30%
3	H = 2 M = 0 L = 1	H = 1 M = 0 L = 0	H = 0 M = 1 L = 0	H = 3 M = 1 L = 1	5	0.19%	0.16%
4	H = 2 M = 1 L = 0	H = 3 M = 0 L = 1	H = 3 M = 1 L = 0	H = 8 M = 2 L = 1	11	0.67%	0.37%
5	H = 4 M = 2 L = 2	H = 3 M = 1 L = 1	H = 3 M = 2 L = 0	H = 10 M = 5 L = 3	18	0.67%	0.60%
6							
7							
8	H = 2 M = 1 L = 0	H = 3 M = 1 L = 1	H = 1 M = 1 L = 0	H = 6 M = 3 L = 1	10	0.48%	0.33%

Table 3: A sample of the data obtained from the item analysis for the gap-fill test

Looking at the results, question 3 had to be discarded as both discriminability and difficulty are quite far outside of the acceptable range. The results for question 2 indicated an acceptable level of discriminability; however, it had a difficulty level of 0.30%. Because, however, this is just outside of the recommended range and because it tests language items that will be included in the intervention, this item was retained.

Timed Grammaticality Judgment Test

The same piloting process was completed for the grammaticality judgment test as for the gap-fill test. The layout of the test was changed following feedback from the students, to include instructions in Japanese as students were initially unclear of what was required of them. Furthermore, the test was shortened quite considerably, as it took far longer to complete than had been anticipated. The final version of the test contains 13 items, 10 of which test for knowledge of the target language. A sample of the test is presented opposite.

Q.	Sentence	Right	Wrong	Don't Know	Correction
1	When students start at a new school, they can be join a club activity.				
2	Students are allowed to use not their mobile phones in class.				
3	Because he trains so hard, he can plays soccer very well.				
4	The longer river in the world is, of course, The Nile.				
5	People are allowed to can walk their dogs in the park.				
6	Many high school students can't getting a part-time job.				
7	To be honest, I hardly never help with the housework.				
8	Passengers have to buy a ticket before they get on the train.				
9	High school students are not allowed to dying their hair.				

Table 4: A sample of the layout and questions in the timed grammaticality judgement test

The table shows a sample of the results of the item analysis. When calculating the results, for each item students could score a total of 2 points. When a student could correctly identify if a mistake had been made, he/she would score 1 point. If the student was further able to provide the correction, the student was awarded 2 points, if the correction was appropriate. Where 'don't know' was marked, this was treated as being incorrect and was given 0.

B	C	D	E	F	G	H	I
Q. No.	Group 1	Group 2	Group 3	Group Totals	Total Correct Answers	Disc.	Difficulty
1	H= 5 M= 0 L= 0	H= 6 M= 1 L= 1	H=0 M= 1 L= 1	H= 11 M= 2 L= 2	15	0.43%	0.25%
2	H= 9 M= 4 L= 1	H= 5 M= 3 L= 2	H= 4 M= 1 L= 0	H= 18 M= 8 L= 3	29	0.71%	0.48%
3	H= 3 M =2 L= 0	H= 2 M= 1 L= 1	H= 3 M= 1 L= 1	H= 8 M =4 L= 2	14	0.29%	0.23%
4	H= M= L=	H= M= L=	H= M= L=	H= M= L=			
5	H= 5 M= 3 L= 0	H= 4 M= 2 L= 2	H= 6 M= 4 L= 2	H=15 M =9 L=4	29	0.57	0.48
6	H= 3 M= 3 L= 1	H= 6 M= 1 L= 2	H=4 M= 2 L=1	H=13 M=6 L=4	23	0.43	0.38%
7	H= M= L=	H= M= L=	H= M= L=	H= M= L=			
8	H= 4 M= 1 L= 2	H= 4 M= 2 L= 0	H= 3 M= 1 L= 0	H=11 M=3 L=2	17	0.43	0.28
9	H= 6 M= 1 L =1	H= 4 M= 2 L =1	H= 4 M= 0 L= 0	H = 14 M=3 L=2	19	0.57	0.32

Table 5: A sample of the data obtained from the item analysis
for the timed grammaticality judgement test

Modals Speaking Tasks

The objective of this task was to have students use the target language to make rules in different situations. Prompts were given at the bottom of the task that students could follow. On piloting the task it became apparent that it suffered from a number of defects. First, the instructions were initially only in English, and this caused students some difficulty as they were not familiar with this type of exercise. Second, many students found the prompts in the box to be confusing and multiple answers were possible. Finally, while students were told orally that they needed to record 8 sentences, many stopped after only 1 or 2. In the second version of the task, instructions are given in both English and Japanese, and symbols were added to the prompts in the box, more clearly directing the students to produce the target language. The tasks are presented in Appendix C.

In spite of these modifications, a number of problems, related to the procedures, persisted. First, some of the audio files were useable others were not. Students used the audio recording function on their iPads to record themselves. IC recorders would have been preferable; however, these are not available at the school. Moreover, it was also clear that some of the

students had copied each other. This could have been overcome by having students record themselves individually; however, this was not practical because of the disruption that would have been caused. In light of these problems, the modals speaking task can not be included in the full-scale main trial.

Survey

The survey was initially pre-piloted, with both Japanese and non-Japanese colleagues, to check that the questions were clear and the translations accurate and to ask for suggestions on whether there were any items that should have been included. Cohen et al (2015) write that structured surveys can prevent respondents from adding further important information. By piloting the questionnaire researchers can see if there are any significant gaps in the instrument.

The instrument was then tested with one of the grade 3 groups to make sure that students understood how to complete a Likert-style survey and to confirm that the items were easily understood. The time taken to complete the survey also had to be confirmed. Porter et al (2004), warn of the danger of survey fatigue. The authors note that research on respondent burden – defined as the time and effort required to complete a survey – has generally found that longer surveys will often result in a lower response rate. A number of modifications were made to the instrument at this point. The surveys are presented in Appendix D.

Having obtained positive feedback from the pilot, the survey was tested again, this time using 2 groups (*n*=20). Using Excel, the value for Cronbach alpha was calculated, producing a value of 0.72 which indicates that it is a reliable and valid instrument and so it can be used in the full-scale main trial.

Statistical Analyses

As noted above, pilot studies cannot be used to test hypotheses as the data is, necessarily, incomplete. The sample is not sufficiently large and modifications that are made to the data collection instruments will affect results that are subsequently collected. The data presented should, therefore, be regarded as preliminary.

Statistical Analysis Gap Fill Test

An ANOVA was conducted to see if there was a statistically significant difference within the groups in terms of their test scores before and after the intervention. 3 tests were conducted: the pre-test, an immediate post-test and a delayed post-test, which was conducted one month after the intervention. As the analysis was conducted using Excel, it's the columns bar that shows the data for the repeated measures.

Looking first at the control group, the calculated f of 0.762 is less than the critical f of 3.55, which suggests that there was not a significant difference in the grammatical accuracy of these students. Moving on to the results of the teacher-led and student-led groups, in both there was a significant difference between their pre- and post-test scores, which suggests that error correction is effective in developing the grammatical accuracy of learners.

An independent samples t-test on the results of the immediate post-tests was then conducted. Between the control and the teacher-led group the results were statistically significant, as can

be seen from the p value. However, the t-test comparing the teacher-led and student -led groups failed to produce a statistically significant result.

The data are presented in Appendix E.

Statistical Analysis Timed Grammaticality Judgement Test

Looking at the values for the calculated f and the critical f the results of the ANOVA indicate that there was a significant difference in the results of all of the groups. As can be seen, however, the results for the teacher and student-led groups suggest that for these groups the intervention had a far greater impact.

An independent samples t-test on the results of the immediate post-tests was undertaken to look at the differences between the different groups. Between the control and the teacher-led group the results were statistically significant, as can be seen from the p value. However, once again the t-test comparing the teacher-led and student-led groups failed to produce a statistically significant result.

The data are presented in Appendix F.

Conclusion

Pilot studies are an essential part of the research process. They allow researchers to test the feasibility of a proposed study and to test the instrumentation and procedures that will be used. This paper has looked at the implementation of a pilot study prior to a full-scale main trial, which will investigate the efficacy of student- versus teacher-led correction, as well as students' attitudes to error correction.

Regarding the instructional materials, benchmarks were defined against which their suitability could be measured. The materials successfully elicited the target structures and they were both appropriate for the students' proficiency level and of interest. It was, therefore, concluded that they could be used.

Moving on to the data collection instruments, in terms of the gap fill and timed grammaticality judgement tasks, as a result of the feedback obtained from the students, a number of important modifications were made, which greatly increased their clarity. Furthermore, the results of the item analyses show that with the modifications that were made both instruments can be used in the full-scale main trial. The procedures that were used were suitable and did not have to be altered.

In terms of the modals speaking task, in spite of the changes that were made, the data that was obtained was often neither valid nor reliable. Copying continued to be a problem and a number of the audio files could not be transcribed because of the poor sound quality. The tasks will not, therefore, be used in the full-scale main trial.

With regards to the survey, feedback from the students led to a number of the items being changed. The result of the Cronbach analysis confirms its internal consistency and shows that it can be used in the full- scale trial.

Looking at the data that was obtained, while this is only preliminary, a number of tentative conclusions can be drawn. Error correction does appear to have a positive impact on students' grammatical accuracy with regards to their use of modals expressing permission. This impact could be seen in both immediate and delayed post-tests. The data was not clear, however, as to whether student or teacher-led correction was more effective. The results of the survey indicated, though, that a small majority favoured student-led techniques.

Appendixes

Appendix A– Intervention Instructional Materials

Cooking Club

You are the leaders of the cooking club. You want the students to have fun, to make a lot of delicious food and, most importantly to be safe. Kitchens can be a dangerous place and rules are important. So what rules do you think are important?

Task

In your group, use **must** and **must not** to write 5 rules for cooking club members. *(You can use these ideas to help)*

1. _____
2. _____
3. _____
4. _____
5. _____

Rules at Home ~ Reading (A)

Sarah is sixteen and she lives with her mother and father in a small home in Brighton in England.

Part 1
Read the text about the different rules that Sarah has and then answer the questions.

Some of my friends have very strict parents. But my parents are pretty easy-going. Of course, there are some rules though.

I have to clean my room every day. I have to do the vacuuming and put all my clothes into the washing machine. I also have to take the trash out. I don't have to clean the other rooms. My parents do that.

During the week I have to go to bed by 11:30 p.m. It's important to sleep a lot. At the weekend, I don't have to go to bed early, because on Saturday and Sunday I don't have to go to school, so I can stay in bed until late.

One strange rule that we have is that I have to cook once a week. Luckily, I don't have to do the washing up. I hate washing up!

Sarah		Dave	
1. How often does she have to clean her room?		1. How often does he have to clean her room?	
2. What time does she have to go to bed?		2. What time does he have to go to bed?	
3. Does she have to go to school at the weekend?		3. Does he have to go to school at the weekend?	
4. What is a strange rule that she has?		4. What is a strange rule that he has?	

Part 2
Now, talk to your partner and answer the questions for Dave.

Glossary
Strict = 厳しい
Easy-going = 気楽な
Washing up = 洗い物

Life at Home – Survey

Every home has different rules.
Write questions with have to to find out the rules at your partner's house.
Remember, we can start questions with 'do' or a question word, who, what, when etc.

Questions	Student 1	Student 2
1. How much homework do you have to do every day?		
2. Do you have to take your shoes off at home?		
3.		
4.		
5.		
6.		
7. What rule is the hardest to do?		

Appendix B – Modals Gap-fill Task

Gap Fill - Modals

Instructions

- Look at the sentences below.
- Write the missing word or words in the spaces.
- Try to answer all of the questions.
- This is a review exercise. Don't worry about the grades!

1. How many times have you _____ to Disneyland?
2. In Japan, people under 18 are _____ to buy alcohol.
3. The doctor says I _____ stay at home and take some medicine.
4. People are _____ to play ball games in the park.
5. You _____ ride your bicycle here.
6. Eating a lot of fruit and vegetables is very _____
7. I started to _____ tennis three years ago.
8. You _____ wear a tie if you don't want to.
9. You are _____ to use your hands in soccer if you are not the goalkeeper.
10. You are _____ to touch the animals.
11. In soccer, you are _____ to use your feet and your head.

What are the missing words?

- Write the missing word or words in the spaces.
  空欄に足りない単語を記入してください
- Try to answer all of the questions.
  すべての質問に答えよう
- You have 4 minutes to complete the questions
  4 分間で質問に答えてください。

1.		How many times have you _____ t Disneyland?
2.		In Japan, people under 18 are _____ to bu alcohol.
3.		You _____ ride your bicycle here.
4.		You _____ wear a tie if you don't want to.
5.		Eating a lot of fruit and vegetables is very _____

Appendix C – Modals Speaking Task

Talking about School Rules

- Make sentences about the pictures below.
- Record your speech on Loilonote.
- Use the words and ideas from the boxes to help.
- Try to speak for about one and half minutes.

Picture 1

Schools often have many rules. What rules do students have to follow so that they will not get into trouble?

- **Use the words and ideas from the boxes to help.**

School uniform
Homework
Part-time job
Fighting
On time
School club
Mobile phone / cell phone
Bento

Talking about School Rules

- Make sentences about the pictures below. (下の写真について文章を作りなさい。)
- Record the sentences on Loilonote. (ロイロノートに文章を記録する)
- Use the words and ideas from the boxes to help. (箱の中にある言葉やアイデアを役立てよう。)
- You need to make 8 sentences. (8 つの文章を作る必要がある)

Picture 1

Schools often have many rules. What rules do students have to follow so that they will not get into trouble?

- **Use the words and ideas from the boxes to help.**

School uniform ✓
Homework ✓
Part-time job ✗
Fighting ✗
On time ✓
School club ⊘
Mobile phone / cell phone ✗
Bento ⊘

Appendix D – Students Views on E.C. - Survey

Feedback

- Please say if you agree or disagree with the statements below.
以下の記述に賛成か反対かをお答えください。
- All of your answers are anonymous. Data will only be kept as statistics.
回答はすべて匿名です。データは統計としてのみ保存されます。
- The information you give will help us to improve how we teach English.
いただいた情報は、私たちの英語教育の改善に役立てられます。
- You **DO NOT** have to complete this survey if you do not want to.
アンケートに回答したくない場合は、回答する必要はありません

Strongly disagree = 1　　**Disagree** = 2　　**Don't agree or disagree** = 3　　**Agree** =4　　**Strongly agree** = 5

Statement	1	2	3	4	5
1. It is important that my grammar mistakes are corrected. 私の文法ミスを直してくれることが重要です。					
2. It is the teacher's job to correct my mistakes. 私の間違いを正すのは、先生の仕事です。					
3. Listening to the teacher correcting mistakes is quite boring. 先生が間違いを訂正しているのを聞くのは、かなり退屈です。					
4. I want the teacher to explain the necessary grammar to me. 必要な文法を先生に説明してほしい。					
5. I learn more if I correct my own mistakes than if the teacher corrects my mistakes. 先生が間違いを正してくれるより、自分で間違いを正した方が身につく。					
6. I like to work with a partner to correct my mistakes. 私は、パートナーと一緒に間違いを修正するのが好きです。					
7. I think it is good to correct mistakes as a group. グループとして間違いを修正するのは良いことだと思います。					
8. It is embarrassing if other students see my mistakes. 自分の失敗を他の生徒に見られると恥ずかしい。					

Feedback

- Please say if you agree or disagree with the statements below.
以下の記述に賛成か反対かをお答えください。
- All of your answers are anonymous. Data will only be kept as statistics.
回答はすべて匿名です。データは統計としてのみ保存されます。
- The information you give will help us to improve how we teach English.
いただいた情報は、私たちの英語教育の改善に役立てられます。
- You **DO NOT** have to complete this survey if you do not want to.
アンケートに回答したくない場合は、回答する必要はありません

Strongly disagree = 1　　**Disagree** = 2　　**Don't agree or disagree** = 3　　**Agree** =4　　**Strongly agree** = 5.

Statement	1	2	3	4	5
1. It is important that my grammar mistakes are corrected. 私の文法ミスを直してくれることが重要です。					
2. Students and teachers should work together to correct students' mistakes. 生徒と教師は協力して生徒の間違いを正すべきである。					
3. The teacher's explanations of grammar help me to communicate more accurately. 先生方の文法の説明のおかげで、より正確なコミュニケーションができるようになりました。					
4. I want the teacher to explain the necessary grammar to me. 必要な文法を先生に説明してほしい。					
5. It is important that I have the chance to correct myself before the teacher corrects me. 先生に訂正される前に、自分で訂正する機会を持つことが重要なのです。					
6. I like to work with a partner to correct my mistakes. 私は、パートナーと一緒に間違いを修正するのが好きです。					
7. I think it is good to correct mistakes as a group. グループとして間違いを修正するのは良いことだと思います。					
8. Correcting mistakes as a group helps other students to learn. グループで間違いを正すことは、他の生徒の学習にも役立つ。					

Appendix E - Statistical Analysis Gap Fill Test

ANOVA Control Group

Source of Variation	SS	df	MS	F	P-value	F crit
Rows	2829.499	9	314.3887	5.018553	0.001789	2.456281
Columns	95.52467	2	47.76233	0.762425	0.48102	3.554557
Error	1127.615	18	62.6453			
Total	4052.639	29				

ANOVA Teacher-led correction

Source of Variation	SS	df	MS	F	P-value	F crit
Rows	4914.268	9	546.0298	8.520222	6.83E-05	2.456281
Columns	2374.766	2	1187.383	18.52787	4.27E-05	3.554557
Error	1153.554	18	64.08633			
Total	8442.588	29				

ANOVA Student-led Correction

Source of Variation	SS	df	MS	F	P-value	F crit
Rows	9039.678	9	1004.409	23.2293	3.87E-08	2.456281
Columns	2203.631	2	1101.816	25.48207	5.62E-06	3.554557
Error	778.2995	18	43.23886			
Total	12021.61	29				

Control group and teacher-led intervention

t-Test: Two-Sample Assuming Unequal Variances

t Stat	-2.71088
P(T<=t) one-tail	0.007417
t Critical one-tail	1.739607
P(T<=t) two-tail	0.014834
t Critical two-tail	2.109816

Teacher and Student-led Intervention Groups

t-Test: Two-Sample Assuming Unequal Variances

t Stat	-0.31943
P(T<=t) one-tail	0.376539
t Critical one-tail	1.734064
P(T<=t) two-tail	0.753078
t Critical two-tail	2.100922

Appendix F - Statistical Analysis Timed Grammaticality Judgement Test

ANOVA Control Group

Source of Variation	SS	df	MS	F	P-value	F crit
Rows	1473.119	9	163.6799	27.04575	1.13E-08	2.456281
Columns	68.36467	2	34.18233	5.64814	0.012478	3.554557
Error	108.9353	18	6.051963			
Total	1650.419	29				

ANOVA Teacher-led Intervention

Source of Variation	SS	df	MS	F	P-value	F crit
Rows	3222.87	9	358.0966	17.61577	3.45E-07	2.456281
Columns	649.206	2	324.603	15.96812	0.000103	3.554557
Error	365.9073	18	20.32819			
Total	4237.983	29				

ANOVA Student-led Intervention

Source of Variation	SS	df	MS	F	P-value	F crit
Rows	2159.579	9	239.9532	29.71407	5.21E-09	2.456281
Columns	356.5227	2	178.2613	22.07459	1.43E-05	3.554557
Error	145.3573	18	8.075407			
Total	2661.459	29				

Control Group and Teacher-led Intervention
t-Test: Two-Sample Assuming Unequal Variances

t Stat	-2.5625
P(T<=t) one-tail	0.010434
t Critical one-tail	1.745884
P(T<=t) two-tail	**0.02087**
t Critical two-tail	2.119905

Teacher-led and Student-led error correction
t-Test: Two-Sample Assuming Unequal Variances

	TLIPT	SLIPT
t Stat	0.812369	
P(T<=t) one-tail	0.213905	
t Critical one-tail	1.739607	
P(T<=t) two-tail	0.42781	
t Critical two-tail	2.109816	

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A Quantitative and Qualitative Evaluation of a Growth Group Program for Empathy Training

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Abstract

Empathy can be conceptualized as three components: cognitive capacity, emotional capacity, and expressive and communicative motive. A growth group program is designed to comprise these three components of empathy. Mu wave (8-13 Hz band) in human electroencephalography (EEG) is a signature of mirror neurons which involve in social functions such as empathy and theory of mind. This study aims to investigate whether a growth group can improve the performance and change the activity of the mirror neuron system. Among twenty-seven undergraduate students selected from a class of taking a general education course, fifteen students are randomly assigned to the experimental group to attend a growth group. Twelve students are randomly assigned to the control group to attend a regular psychology class. After ten times of meetings, both control and experimental groups receive the measures of an empathy scale and then EEG. Participants' feeling and thoughts after the meeting were recorded for a qualitative analysis. The results show that the experimental group performs better than the control group on the testing scores of empathy scale. Mu wave suppression measured from Cz electrode site is significantly larger in the experimental group compared to the control group, indicating that mirror neurons are more active under the condition of self-movement in the experimental group. The qualitative data show that participants feel more confident with using empathic skills in their daily life. The conclusion is that a growth group for empathy training can change the behavior and the brain to some extent.

Keywords: Empathy Training, Mu Wave, Mirror Neuron, Empathy Scale

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Introduction

The mirror neuron system (MNS) was first found to be firing in the monkey's premotor cortex when the monkey performed action or observed others' action (Rizzolatti and Fadiga, 1998). The study further showed that the MNS was responsible for understanding the feelings and intentions underlying the observed action (Iacoboni et al., 2005). The human EEG mu wave (8-13 Hz band) suppression was a validated index of the MNS activity and modulated by the degrees of social interaction (Oberman et al., 2007). Some individuals with autism spectrum disorder showed not only the deficit of social interaction, but also the dysfunction of the mu save suppression when they were observing the others' hand movements (Oberman et al., 2005). Cheng et al. (2009) also found that the degree of mu wave suppression was positively related with the empathic scores of interpersonal reactivity index. Moore et al. (2012) found that the mu wave suppression was related to the recognition of human facial emotions (including both positive and negative emotions). Braadbaart et al. (2014) found that the degree of the mu wave suppression was positively related to the degree of correctly imitating the others' facial expressions. Overall, the evidence mentioned above suggests that the MNS played an essential role for many social skills, such as facial emotion recognition and empathy.

Rogers (1957) defined empathy as: the ability to sense the client's private world as if it were your own, but without ever losing the 'as if' quality. According to Hoffman (1977, 1984) and Smith (2006), empathy can be conceptualized as three components: cognitive capacity, emotional capacity, and expressive and communicative motive. Cognitive capacity means that one can understand the other's inner (maybe hidden) thoughts from a perspective of the other. Emotional capacity means that one can sense the other's emotions and feelings from his/her words and body language, yet without one's own emotions getting bound up in it. The expressive and communicative motive means that one can sincerely respond to what one has understood and sensed and communicate with the other. Therefore, empathy can be cultivated by training and experiences for empathic practices. For example, Higgins (1990) and Long (1999) have shown that no matter college students or married adults can improve not only their empathic abilities but also interpersonal relationships after they participate in a growth group for ten hours. Overall, literature reviewed above indicate that empathy training can enhance the empathic abilities and seem to have a positive effect on the interpersonal behaviors. However, whether the empathy training can change the brain seem to remain unclear. This study aims to investigate whether empathy training can not only improve the knowledge and behavioral performance but also change the activity of the MNS.

Methods

Participants

Among twenty-seven NCUE undergraduate students selected from a class of taking a general education course, fifteen students are randomly assigned to the experimental group to attend empathy training group for practicing emotional, cognitive and expressive empathy. Twelve students are randomly assigned to the control group to attend a regular class for learning the knowledge of general psychology.

EEG Measurement

Participants put on an electrode cap with 32 electrode channels connected to Neuroscan Synamps system. EEG (and EOG) data collection is performed in the following four conditions: (1) moving own hand, (2) watching a video of a moving hand, (3) watch a video of two bouncing balls, and (4) watch a video of visual white noise. In condition 2 and 3, the moving hand or ball is sometimes paused for about 2 seconds, and participants are asked to count the number of times when the hand or ball stops moving and report the number of stops to the experimenter at the end of the block. Each condition is performed for about 90 seconds. The reference electrodes are located on the earlobes of both ears. Vertical eye movements were recorded above and below the left eye. The recording position of horizontal eye movement is about 1 cm outside the corner of the eye. Electrodes and skin contact resistance are below 5k Ohm. Filter settings were high pass (0.01 Hz) and low pass (50 Hz). The sampling rate is 500 Hz.

Empathy Measurement

A Chinese version of the Interpersonal Reactivity Index (Andrew and Shek, 2002) is adopted to measure the behavioral performance of empathy. The empathy score is calculated from two subscales: perspective taking and empathic concern, made up of 11 items, each of which is answered on a 5-point Likert scale ranging from "Does not describe me well" (0 point) to "Describes me very well" (4 point). The higher score indicates a better performance, except for three items scored in reverse fashion.

Procedure

The experiment group participated once a week in a growth group described as the following: In week 1, the activity was called "who is who". Every two group members introduced to each other and then introduced his/her partner to all. After this warm-up activity, each member chose two characteristic terms to describe self and the partner, then shared the difference between self-perception and what the partner has perceived. The purpose of week 1 meeting was to make each group member learn how to observe and give feedback to the other member.

In week 2, the activity was called "nonverbal perception". Every two group members talk about a personal story to each other and then write down what had been talked about and what had been perceived in addition to words when the partner was talking. The purpose of week 2 meeting was to learn how to concentrate on verbal and nonverbal information when listening to the other.

In week 3, the activity was called "listening without looking". Every two group members with eyes closed described one apple in a basket of apples to each other and then found out the special apple just described by the partner. The purpose of week 3 meeting was to learn about the difference in perspective of how people perceived a thing.

In week 4, the activity was called "a touching picture". Every two group members together looked at a scenery picture and write down which part had touched the self while taking a guess what part had touched the partner. The purpose of week 4 meeting was to learn how to express own feelings and to sense the other's feeling.

In week 5, the activity was called "sentence completion". Each member finished a homework of sentence completion by using at least an emotional word, and then picked up a sentence and read out it with a tone matched to the emotional words. The purpose of week 5 meeting was to be aware of what kind of feeling was expressed in the words and sentence and give a genuine feedback.

In week 6, the activity was called "listening to body talking". Each member kept his/her mind on the body and shared what had been felt about his/her body after the leader told each member to stretch out his/her hands and legs to a limit. The purpose of week 6 meeting was to be aware of information emitted from the body and learn how to express own feelings and sense the other's feelings.

In week 7, the activity was called "what happened". Every two group members talked to each other with the first words "what happened" and then the listener helped to clarify what was really happened by using the questions of who, how, when, where and what. The purpose of week 7 meeting was to learn how to clarify what had not been told yet during the conversation.

In week 8, the activity was called "role-playing". The leader invited one member to share his/her negative interpersonal experience and then direct a drama about that experience. The other members played one role in the drama. The purpose of week 8 meeting was to learn how to sense the inner world of a role in the drama and communicate with the other actor.

In week 9, the activity was called "compassion meditation". Each member breathed with mindfulness for three minutes and then meditated on someone who ever gave him/her unconditional love. Each member perceived self being loved and felt happiness and peacefulness that love brought. Finally, each member meditated on the partner and wished him/her happiness and peacefulness. The purpose of week 9 meeting was to feel compassion on self and the partner.

In week 10, the leader reviewed all activities and the special moments that each member had experienced. Each member shared thoughts and feelings of the group and made a wish that he/she would perform empathy in everyday life.

After ten times of meetings, both control and experimental groups received the measures of the Interpersonal Reactivity Index (Chinese version) and then EEG.

EEG Analysis

EEG was analyzed using a Neuroscan Synamps system (Scan 4.3). At first, EOG signals were deleted in each experimental condition. The fragments about 15 seconds from the beginning and to the end were also deleted to avoid alpha wave interference from the visual area. Data for each experimental case was combined, so there was approximately 2 minutes of data for each experimental condition. For every 2-second segment, fast Fourier transformation was used to calculate the power of the 8–13Hz bandwidth (mu wave). Considering the individual differences in the absolute value of mu wave power, the mu power obtained in experimental condition 4 was used as the baseline. The ratio value was obtained from dividing the mu power of each experimental situation by the baseline, and then did log conversion for final analysis. A negative value indicates mu suppression. Larger negative values indicate greater suppression.

Results

A Quantitative Analysis

The results of Student's t test show that the experimental group performs (M = 30.4, SD = 4.2) better than the control group (M = 26.2, SD = 4.6) on the testing scores of empathy scale in the Interpersonal Reactivity Index, t(25) = 2.49, p < 0.05. Mu wave suppression (shown in Table 1 and Figure 1) in experimental condition 1 measured from Cz electrode site is significantly larger in the experimental group compared to the control group, t(25) = 2.07, p < 0.05, indicating that mirror neurons are more active under the condition of self-movement in the experimental group. However, mu wave suppression measured from C3 and C4 electrode sites is not significantly different between two groups, t(25) = 0.84, p = 0.41, t(25) = 1.57, p = 0.13, respectively. The qualitative data show that participants feel more confident with using empathic skills in their daily life.
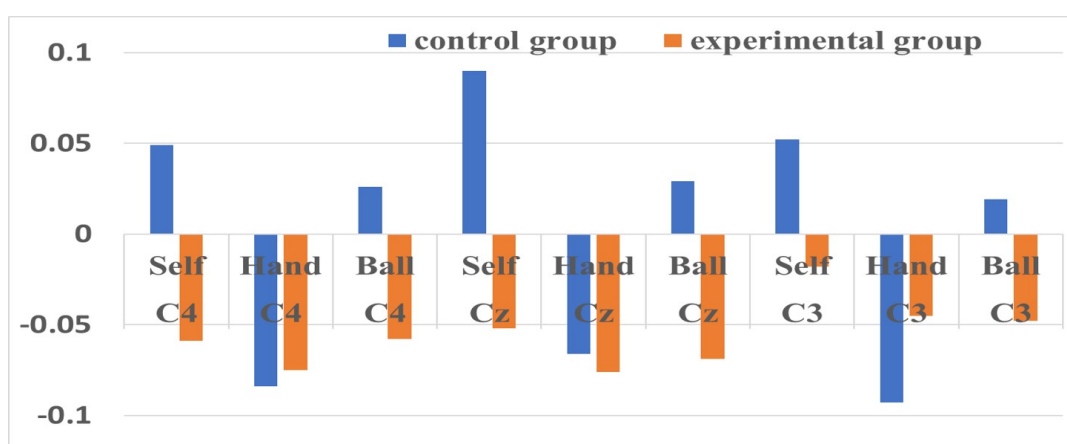
Figure 1. Mu suppression in control and experimental group. A negative value indicates mu suppression. Larger negative values indicate greater suppression.
A symbol (*) means a significant difference.

Table 1. Mu suppression in control and experimental group measured from three experimental conditions(moving own hand, watching a video of a moving hand, and watch a video of two bouncing balls) and three electrode sites (C4, Cz, and C3).

	Control group			Experimental group		
	Self	Hand	Ball	Self	Hand	Ball
C4	0.049	-0.084	0.026	-0.059	-0.075	-0.058
Cz	0.090	-0.066	0.029	-0.052	-0.076	-0.069
C3	0.052	-0.093	0.019	-0.018	-0.045	-0.048

A Qualitative Analysis

According to data collected from the feedback of each participant during the growth group activity of each week, participants (coded as A through O) showed their cognitive and emotional empathy. For example, when D said that he was an introvert and liked reading and being alone, G responded, "I feel that D is a thinker, full of ideas, but may be just not good at showing them." When E observed that G kept her head down and silent for a long time, E said to G, "You look unhappy, do you want to talk about what happened?" When O talked about her story that she hated her younger brother because she felt that her brother stole my mother's love from me, F responded, "If I were you, I may feel the same as you.", and N responded, "it is just a feeling, neither your fault nor anybody else." In the last meeting, participants felt more confident with using empathic skills in their daily life. For example, participant D talked about his change:

> *Before joining the growth group, I always feel that my interpersonal relationships are very poor and I have few friends. At the beginning of the group, I feel a little nervous and don't dare to express my opinion. About the second time, I hear C say to me: He can understand my uneasiness because he is also an introvert and is not good at expressing his inner thoughts and feelings. I suddenly felt a sense of acceptance and understanding. I gradually learn to be more attentive to the thoughts and feelings of other members when they shared. I also hope to bring that feeling of being understood to others.*

Conclusion

After participating in ten meetings of a growth group designed for empathy training, the empathic performance in the experimental group on the Interpersonal Reactivity Index is significantly increased. At the same time, the MNS has become more activated in the experimental group. Therefore, the empathy training can change the behavior and the brain to some extent.

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Gender Differences in Perceptions of Digital Device Use and Reading Literacy: Insights From PISA 2018

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Abstract
Gender gaps in literacy arise from ingrained perceptions of masculinity and femininity dictating gender-specific activities in children. While digital literacy enhances classroom engagement, its impact on higher education learning outcomes remains inconclusive. The purpose of this study was to investigate whether there are differences in the perceptions of male and female students regarding the use of digital devices in reading literacy, based on the PISA 2018 test. A quantitative method, using T-test analysis, was employed for the research. The population of this study consisted of 15-year-old students in 2018, with a sample of 15-year-old students who participated in the PISA test across 80 countries. Data for this study were gathered through questionnaires answered by 612,004 students from 80 countries. The research found significant differences between male and female students in the use of digital devices for reading literacy. Female students tend to be less digitally active, influenced by financial constraints, educational disparities, and social norms. The increasing use of information and communication technology (ICT) indicates the complexity of its relationship with reading literacy. The importance of specific online activities and motivational strategies in enhancing reading skills and students' confidence highlights the key role of a holistic approach. The gender gap in technology utilization underscores the need for improving female literacy to address disparities in technology adoption.

Keywords: Gender Differences, Perception, Reading Literacy, PISA 2018 Test

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Introduction

The research findings of Kong et al. (2022) reveal that students' attitudes towards the use of digital devices are positively correlated with digital reading achievement. This is linked to the need for proficient readers in the digital world with a strong foundation in reading, as well as the critical thinking abilities of students (Suarez-Alvarez et al., 2022). Additionally, a disciplinary climate is required to facilitate the formation of students' reading self-concept, impacting the improvement of their reading performance at the school level (Ma et al., 2022).

Nevertheless, several studies (Delgado et al., 2018; Kong et al., 2018; Clinton, 2019; Singh & Alexander, 2022) indicate that paper media supports better comprehension than screen media, especially when reading longer and more complex texts. Meanwhile, according to the results of the 2018 PISA survey, reading performance has declined in many countries. At the adolescent level, there is a reported significant decline in leisure reading, combining readings, and digital technology skills (Weel and Mangen, 2022).

Concerning gender issues, Ritonga and Sutapa (2021) state that during the preschool period, gender roles influence children in choosing daily activities, including the selection of reading materials. Furthermore, based on the World Economic Forum's report (2021), gender inequality in the future is associated with employment, with the factor of lower wage inequality for women compared to men.

In responding to various findings, there is a need for research with more universal data. One option is to utilize data from the PISA survey. In line with the issues raised, this research aims to investigate whether there are any differences in the perceptions of male and female students regarding the use of digital devices in reading literacy based on the PISA 2018 test. The significance of this research lies in providing valuable insights that can be used by teachers and students as a reference for school policies.

Research Method

It used a quantitative research methodology. This strategy was chosen because it aligns with the study's primary objectives, which are to gather data from observed symptoms and utilize the study's data. The study employed PISA 2018 data, which is freely accessible and can be used for research and development (source: https://www.oecd.org/pisa/data/).

The sample consisted of pupils who had completed the PISA exams at the age of 15 in 80 different countries, representing the group of 15-year-olds who attended school in 2018. These pupils participated in the study by responding to a five-option survey. The optional answers included categories such as "I spend 1 to 30 minutes a week," "31 to 60 minutes a week," and "more than 60 minutes a week" (alternatively, "I don't study this subject" or "I don't have time"). These questions pertained to "Time spent using digital devices during classroom courses in a typical school week (test language classes)" in the 2018 PISA assessment.

This pertains to the literacy exam for reading. According to the analysis conducted using Mplus, the Chi-Square Test of model fit yielded a P-value of 0.000, and the Root Mean Square Error of Approximation (RMSEA) estimate in this study was 0.000. The 90% confidence interval for this result ranged from 0.000 to 0.000. These results suggest that, even if the study's instruments were well-fitted to the model, they had very low explanatory value.

The results from the standard model are presented in Table 1 and Figure 1, further supporting this conclusion.

Variable	Estimate	Est./S.E.	P-Value	Decision
Digital	0,885	579,121	0.000	Valid
Gender	0,428	316,274	0.000	Valid

Table 1: Results from a Standardized Model Using Mplus

As shown in Figure 1, the individual dependability for the instrument used in this study was 0.09, while the instrument's perfect reliability value was 1.00. This demonstrates that an object possesses a higher reliability value than a human being. It also reveals that the majority of survey respondents in this study provided low and medium scores, reflecting the realities of everyday school life.

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------------------------------------------------------------------------
| PERSON  612003 INPUT   612003 MEASURED          INFIT       OUTFIT   |
|           TOTAL     COUNT    MEASURE  REALSE   IMNSQ  ZSTD  OMNSQ  ZSTD|
| MEAN      42.2       2.0      -1.68    1.10     .51   -.5    .77   .0|
| P.SD      46.9        .2       1.41     .77     .84    .9    .89   .8|
| REAL RMSE   1.35 TRUE SD     .43  SEPARATION  .32  PERSON RELIABILITY  .09|
|----------------------------------------------------------------------|
| ITEM       2 INPUT      2 MEASURED               INFIT       OUTFIT   |
|           TOTAL     COUNT    MEASURE  REALSE   IMNSQ  ZSTD  OMNSQ  ZSTD|
| MEAN   12854480  601006.0      .00     .00     .16   -9.6    .77   .0|
| P.SD   11935436   10995.0     1.02     .00     .14    .3    .36   9.9|
| REAL RMSE    .00 TRUE SD    1.02  SEPARATION  1039  ITEM  RELIABILITY 1.00|
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Figure 1: Analysis outcomes for Winsteps version 5.2.2.0:
Individual and Equipment Dependability

T-test analysis was the chosen method of analysis for this investigation. The primary objective of this study is to examine potential disparities in how male and female students perceive the use of digital devices for reading literacy in the 2018 PISA test.

To ensure the accuracy of the research analyst's conclusions and to analyze all of the study's data, we utilized the SPSS 22.00 application. Winsteps, Mplus, and SPSS 22.00 were employed to assess instrument and person reliability tests, instrument fit models, and the t-test (Safari, 2022a; Safari, 2022b).

Result

The data below pertains to 612,004 students from 80 different countries, based on the percentage of students who responded to the survey.

Gender	Time spent using digital					Total
	No time	1 - 30 minutes a week	31 - 60 minutes a week	More than 60 minutes a week	I do not study this subject	
Female	**93429** **(27,5%)**	40619 (11,9%)	**17869** **(5,3%)**	19179 (5,6%)	1150 (0,3%)	172246 (50,6%)
Male	**89997** **(26,4%)**	36915 (10,8%)	**18762** **(5,5%)**	20280 (6,0%)	2084 (0,6%)	168038 (49,4%)
Total	183426 (53,9%)	77534 (22,8%)	36631 (10,8%)	39459 (11,6%)	3234 (1,0%)	340284 (100,0%)

Table 2: The Proportion of Students Who Use Digital Devices in Class During a Typical School Week for Test Language Lessons

According to Table 2, the majority of male students who answered "31-60 minutes a week" were 5.3% female and 5.5% male, whereas the majority of female students who responded with "No time" were 27.5% and 26.4% for male.

Gender	N	Mean	Std. Deviation	Std. Error Mean
Female	172246	1,80	1,055	0,003
Male	168038	1,85	1,105	0,003

Table 3: The gender-specific average and standard deviation for the pupils

Male students used digital devices for a longer duration of time than female students, according to Table 3; (mean 1.85, standard deviation 1.105) and (standard deviation 1.055, mean 1.80).

t	df	Sig. (2-tailed)
-13,668	340282	0,000

Table 4: Results of a two-tailed T-test

According to Table 4, male and female students held different opinions about using digital devices to improve their reading skills on the 2018 PISA test (P < 0.000).

Discussion

The findings of this study indicate differences in perceptions between male and female students regarding the use of digital devices for reading literacy in PISA 2018. Female students tend to use digital devices less regularly compared to male students.

Referring to the results of PISA 2018, differences were also found in the assessment of male and female students regarding the use of digital devices for reading literacy. According to the analysis of this study, male students are more inclined to use digital devices than female students (mean 1.85, standard deviation 1.105).

The results of the data analysis need to be reinforced by qualitative data that can explain why such differences occur. Unfortunately, obtaining direct answers as to why these differences exist is not easy. One way to address this is for researchers to utilize several research findings that can support the results of the analysis.

The findings of this study align with the OECD ABC analysis (2015) in the Gender Equality in Education Report, which found that some female students participating in formal education seem to lack confidence in using ICT. Various variables, such as financial constraints, educational gaps, lack of technical understanding, and social norms, impact gender-based digital exclusion (Borgonovi et al., 2018; OECD, 2018; OECD, 2015; Hilbert, 2011; Cooper, 2006; Krupp, 2005). These are some of the main causes of gender gaps in the digital industry.

The use of information and communication technology (ICT) among students is becoming increasingly common, both at home and in school. This study modifies the intensity of ICT use and mediates metacognition to explain the ambiguous relationship between students' ICT use and reading literacy, revealing inconsistent results. The relationship between all forms of ICT use and reading literacy, as well as the growth of ICT use, follows a dynamic pattern starting with a positive effect, then declining to less positive, becoming negative and fluctuating, and ultimately ending with a persistent decline (Li and Wang, 2022).

The research findings from Alharbi (2022) suggest that reading emails, participating in online conversations (such as WhatsApp), reading online news, searching for material online to investigate specific subjects, and seeking practical information (such as schedules) online are significant predictors of improved reading skills and grades. According to the findings of Navarro-Martinez and Pena-Acuna published in 2022, there is a relationship between students' use of technology and social media with their academic progress.

Results from the study by Du et al. (2022) reveal that the confidence level of successful students increases after reading one story about a role model and further improves after reading five stories. According to research conducted in 2022 by Martin et al., reading aloud to others can provide benefits in relationships and socioemotional aspects.

Regarding the design of large-scale assessments and data interpretation, it can have an impact if these findings are confirmed in other countries. According to these findings, students' responses to PISA test items indicate broad abilities rather than specific domain talents (Pokropek et al., 2022). Additionally, motivation and socioeconomic levels are crucial indicators of students' success in reading. Economic inequality may be a factor in the variation of students' reading abilities (Yeung et al., 2022).

According to the investigation by Cai and Yang in 2022, reading strategies—such as comprehension techniques and memorization—are related to the ability to understand mathematics through reading. The findings of the study by Hu and Wang in 2022 indicate positive effects from students' perceptions of instructional adaptation, stimulation of reading engagement, disciplinary atmosphere, teacher involvement, and teacher support.

A student's reading ability is influenced by other students and their schools (Qian and Lau, 2022). This is reinforced by the research results by Tan et al. (2022) based on a questionnaire from 11,364 15-year-old students distributed among 332 schools (5,455 females and 5,909 males) participating in PISA 2018. The results show that students' feelings about school have a direct and beneficial impact on their reading literacy.

According to the study by Marcq and Braeken in 2022, the cognitive aspect of reading in PISA 2018 shows significant differences related to variations in students, schools, and items. The findings of the research by Kaya et al. (2022) indicate that motivational and metacognitive reading characteristics have an impact on PISA reading performance.

According to the research findings of Clavel and Flannery in 2022, there are significant differences between the scores of male and female students in mathematics, reading, and science in single-sex schools and coeducational schools. However, after considering various personal, family, and institutional variables, both male and female students attending single-sex schools generally do not perform worse than their peers attending coeducational schools.

The ideal learning time at the school level has a significant impact, where the time spent on learning and discipline in the classroom is the most crucial factor (Liu, 2012). Additionally, support for teacher autonomy has a positive relationship with the motivation and emotional factors of adolescents. This has important practical implications for educators who want to use various teaching techniques to enhance the confidence, self-esteem, and happiness of teenagers (Wang and Hu, 2022).

There is also a weak positive correlation between reading ability and growth mindset, according to hierarchical analysis by Berardo et al. (2022). Furthermore, Gerstner and Tsyawo (2022) show that there is a spatial dependence in student performance between countries related to the proximity between countries.

With the increasing use of smart mobile devices, our daily internet usage has significantly increased. Prawesti's research (2018), which examines the use of digital reading apps and digital reading activities in elementary schools, is one study related to the use of digital reading apps.

According to the research, a noticeable improvement occurs when students participate in digital reading activities using digital reading media. Students who participate in digital reading programs show greater reading motivation than their peers. Long and Szabo (2016) also suggest the idea that students using digital reading are more motivated than those who do not. Students who read using digital reading programs claim that it enhances their motivation to read.

Digital reading applications have the potential to have either positive or negative effects on a person's reading habits, especially in terms of their interest in reading. Compared to teachers in countries below the average PISA score, teachers in countries with above-average PISA scores often provide feedback to their students and give them access to better reading materials (Safari, 2020).

According to Borgonovi et al. (2018), another reason why women use digital technology at a lower rate than men is because they are not aware of its potential benefits. Dalberg (2012) found that 25% of women who rarely use the internet have no desire to do so, and almost all of them believe that it will not help them.

According to UNESCO, only 83% of women worldwide are literate, compared to 90% of men. Because they are more familiar with this technology or because it is easier to use and access, literate women often use internet platform services such as Skype and YouTube.

Examining the social-cultural aspects of gender gaps in technology is also crucial. About one-fifth of women in India and Egypt believe that the internet is not suitable for them due to many cultural considerations (Borgonovi et al., 2018). In India, 12% of women say they avoid using the internet because of unfavorable social perceptions, while 8% claim their families do not approve of internet use (Dalberg, 2012b).

In general, research findings indicate variations in reading achievement as well as metacognitive strategies and reading attitudes between boys and girls. To reduce gender gaps in reading achievement, it is suggested that teachers help students develop reading-related attitudes and metacognitive skills. This research also provides limitations, practical implications, and suggestions for further research (Acar-Erdol and Akin-Arikan, 2022).

Conclusion

This study reveals significant differences between male and female students in the use of digital devices for reading literacy based on PISA 2018. Female students tend to be less digitally active, and this is found to be associated with factors such as financial constraints, educational gaps, and social norms. The increasing use of information and communication

technology (ICT) indicates the complexity of its relationship with reading literacy, emphasizing the need for understanding the evolution of ICT usage in the educational context.

The study highlights specific online activities that can predict improvements in reading skills and student grades. Additionally, motivational strategies, such as reading inspirational stories, prove effective in boosting students' confidence in reading literacy. The connection between reading ability and achievement in mathematics and science underscores the necessity of a holistic approach to enhance student outcomes.

Gender gaps in the utilization of digital technology, particularly digital reading applications, reflect the socio-cultural challenges faced by women. Therefore, improving literacy levels among women is identified as key to addressing gender disparities in technology adoption. In conclusion, this research provides in-depth insights into the complex interaction between gender, technology, and reading literacy, emphasizing the importance of a holistic approach and the need for further detailed research to understand the dynamics of this phenomenon.

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The Development of a Motor Control Experimental Set Through a Virtual Reality Program by Using Active Learning

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Abstract

The development of a motor control experimental set through a virtual reality program by using active learning. The objectives of this research for 1) Develop a motor control experimental set of operating the motor control circuit 2) Develop an active learning management through a virtual reality program 3) To evaluate the achievement of an active learning management to develop a practical skill 4) To assess the ability of operating the motor control circuit. The statistics for analyzing tool quality are accuracy and the statistics for analyzing the data were mean, standard deviation and percentage. The results showed that 1) The development of the motor control experiment set that was created had a validity or accuracy (IOC) score that passed the criteria, with the average IOC being 0.67-1.00. 2) an active learning management through a virtual reality program 3) The overall quality of activities was at a good level (mean = 4.50, S.D. = 0.81). When considering each aspect, it was found that it was at a very high level, with the highest mean being "learning media (mean = 4.75, S.D. = 0.38) 4) The students' practical skills for motor control circuit passed the criteria, representing 82.60 percent and for the target, 80% of the people are pass the criteria.

Keywords: Virtual Reality Program, Active Learning, Motor Control

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Introduction

The direction of national development in the National Strategy (2018 - 2037) has set important development goals to develop people in every dimension and at every age to be good people smart and quality. Thai people are physically, mentally, intellectually, prepared and have good all-round development, be responsible to society and others, have discipline, maintain morality and be a good citizen of the nation, have the correct principles. Gain essential skills in the 21st century, such as the ability to practice problem solving, adapt, communicate, and work with others more effectively, have a habit of continually learning throughout life. The national strategy (2018) The National Education Plan (2017 - 2036) has specified human resource development as a very important mechanism for bringing the country into the 21st century global society and is a main issue specified in the national strategy and the Thailand 4.0 strategy. Preparing manpower in terms of knowledge and skills Essential competencies such as analytical thinking Ability to solve problems, communicate and work as a team, etc. in order to be aware of the changing trends of the dynamic world. National Education Plan (2017) determine characteristics or indicators of practical ability and learners have self-confidence [6] Praphasara Kotakhun (2012) Learners gain knowledge and understanding from direct experiences, resulting in clarity clearly from the learning experience, bring coping skills, finding ways to solve problems and make decisions will be useful in applying them to life [4] Tisana Khammanee (2007). It can be seen that practical ability is an important skill that should be developed for students along with learning outcomes in various subjects. From the study of methods for developing practical ability, it was found that there is a demonstration learning method. There is an idea according to the concept of [5] Tisana Khammanee (2008) said that the teaching method using demonstration is a process that teachers use to help students learn according to the objectives specified by showing or doing things that the students want to learn, let the learners observe and then have the learners ask questions, discuss and summarize the learning gained from observing the demonstration teaching and the demonstration was divided into teaching steps as follows: 1. Demonstration preparation step 2. Demonstration step 3. Learning activity organizing step. 4. Summary and evaluation stage [1] Jaruwan Toontham (2016) has organized learning with a demonstration model to increase learning achievement and practical skills in using an oscilloscope in Bachelor's degree in Computer Engineering class. The research results found that higher than the 80% threshold with statistical significance at the 0.01 level [1] Jaruwan Toontham (2016) and there is also research by [7] Worawat Promden (2018) that develops basic scientific process skills by teaching a demonstration of operations of the physical changes and chemical changes of Grade 5 students, the results found that organizing learning through hands-on demonstration teaching can develop necessary skills for students. Including making students have important skills that learners in the 21st century need to have practical skills [7] Worawat Promden (2018) Therefore, it can be seen that the demonstration learning method is another one method that can promote practical ability.

From the importance of practical ability and how to solve problems by teaching the above demonstrations. Therefore, the researcher is interested in researching the development of a motor control experiment kit through a virtual reality program by using Active Learning to develop hands-on motor control circuit skills in the electric motor control subject. The advantage of demonstrating through the program is to simulate experiments compared with practice. It is expected that after receiving the learning management, the students will have learning behavior as targeted in the curriculum and in addition [2]. Chusak Plianpu (2002) Using experimental sets for teaching will make the teacher and students interact more by giving advice from the teacher. Students will also practice solving problems on their own and

have the discipline to work and be a team. This will help the learners to have the qualifications that the establishment needs and apply this knowledge to their next career.

Research Objective

1. Develop a motor control experimental set of operating the motor control circuit
2. Develop an active learning management through a virtual reality program
3. To evaluate the achievement of an active learning management to develop a practical skill
4. To assess the ability of operating the motor control circuit

Research Hypotheses

H1: The accuracy or precision of the motor control experiment worksheet for developing a motor control experiment set for operating the motor control circuit passes the criteria.

H2: Active learning activities through a virtual reality program (Simurelay) to develop skills in operating electric motor control circuits by hand in the subject of electric motor control in very good level.

H3: After learning with Active Learning activities through a virtual reality program (Simurelay) to develop skills in operating motor control circuits by hands at least 80 percent.

Research Method

Participants

The population and samples in this research are 20 students from 2nd year undergraduate students in the Bachelor of Technology program. Electrical Technology Major: Faculty of Industrial Education and Technology King Mongkut's University of Technology Thonburi Academic year 1/2022 by sampling by purposive method.

Research Instrument and Procedure

In the research study on the development of motor control circuit construction using Active Learning through a virtual reality program (Simurelay) to develop motor control circuit operation skills by hand in the subject of electric motor control is a research/experimental type by using a preliminary experimental research design with a single experimental group to measure results only after the experiment (The One-Shot Case Study Design, posttest-design) according to the concept of [6] Pariwat Khueankaew (2008) with the following steps: Method Build and quantify each tool. The aim/topic of the experiment worksheet is specified consisting of a total of 5 worksheets, study theories, concepts, documents and various research studies in order to understand the principles of creating experimental worksheets and create a motor control experiment worksheet to develop skills in operating electric motor control circuits by hand. From the desired indicators according to the objectives, which are based on the main idea, choose to develop learner indicators and present the created experimental work sheets to experts. The content validity assessment form (IOC) allows experts to consider validity (Validity) according to the content or consider the consistency between the questions and the objectives (Item-Objective Congruence: IOC).

1. Motor control worksheet: To develop skills in operating electric motor control circuits by hand.

2. Model to evaluate the quality of Active Learning activities through a virtual reality program (Simurelay) to develop skills in operating electric motor control circuits by hand in the subject of 5 aspects of electric motor control.

3. Measurement of practical ability using a motor control experiment worksheet. To develop skills in operating electric motor control circuits by hand with a total of 5 manual motor starting experiment worksheets, with 3 indicators.

Experimental Design

Organizing demonstration learning to develop skills in operating electric motor control circuits by hand, subject of electric motor control. The researcher conducted an experiment with a convenience random sample of 20 people using a single-group experimental research design, measuring only the results after the experiment (The One-Shot Case Study Design, posttest-design) according to the concept of [6]. Pariwat Khueankaew (2008) as follows:

ผังการทดลอง E-Group | X   O |

Figure 1: The experimental design

In writing the experimental diagram, various symbols are used to convey the following meanings.

E-Group = Experimental group of 20 people.
X = Experimental variable of Active Learning through a virtual reality program (Simurelay).
O = Variable based on skills in operating electric motor control circuits by hand.

Data Analysis

1. Analysis of the quality of research tools

Analyze the validity or precision. By calculating the consistency between the questions and the objectives (Item Objective Congruence: IOC), the validity evaluation form of all 5 experimental worksheets from content experts by having quality assessment experts calculate the IOC values.

2. Objective data analysis and hypothesis testing

2.1 Analyze the quality of demonstration learning activities to develop operating skills in manual motor control circuits to check the research hypothesis that the quality is at a better level." Analyze the quality data of the activities obtained from the evaluation of experts by finding the average and calculating the standard deviation. The average is then compared with the average range to determine the quality level. Acceptable values are better level which has an average range of 3.50 - 4.49 with good quality.

2.2 Analyze the scores of the experimental worksheet to develop operating skills in manual electric motor control circuits in the subject of electric motor control to examine the research hypothesis stated. "After learning with Active Learning activities through a virtual reality

program (Simurelay) to develop skills in operating manual motor control circuits in the subject Electric Motor Control. Not less than 80 percent or more according to the assumption.
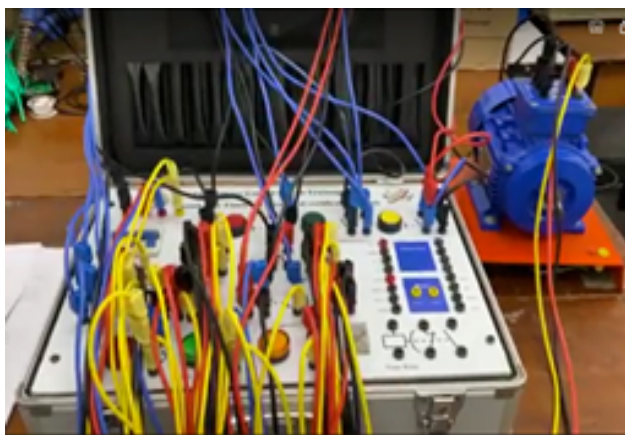
Figure 2: Manual operation of electric motor control circuit
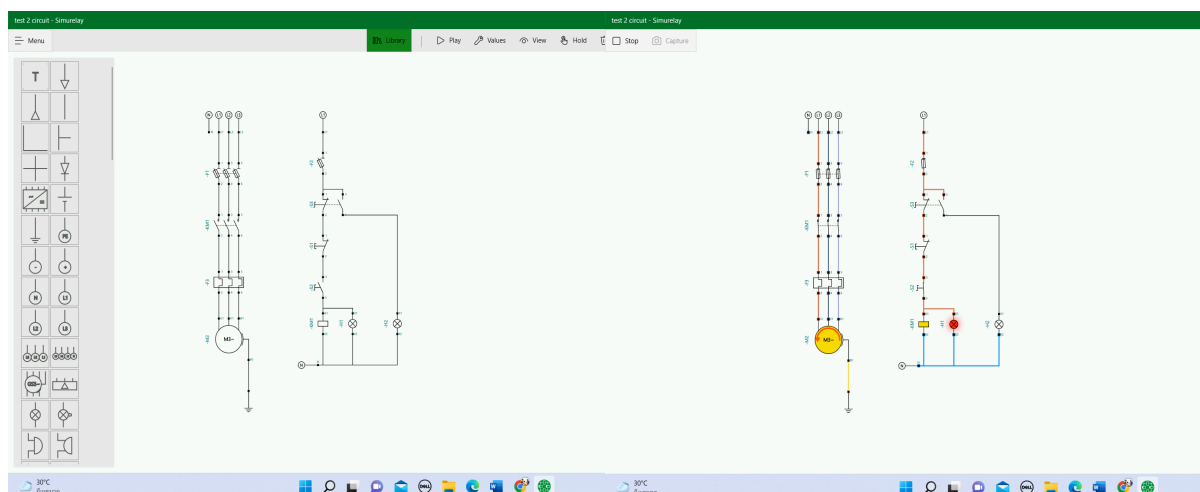
Figure 3: Active Learning through virtual reality programs (Simurelay)

Statistics Used Data Analysis

Precision values using the formula for finding consistency values: IOC (Index of Item Objective Congruence), mean, standard deviation (SD), percentage.

Conclusion

1. Developing motor control worksheets to develop skills in operating hand-on motor control electrical circuits. The accuracy or precision (IOC) scores of the motor control worksheets passed the criteria for all 5 experimental worksheets by the average IOC will be 0.67-1.00. It is considered that the stated assumption is "the validity or reliability of the motor control experiment worksheet to develop skills in operating electrical circuits to control motors by hand, passing the criteria (score 0.50 and above)."

2. Development of a motor control experiment set through a virtual reality program using Active Learning in the subject of electric motor control. The sequence of steps in training is as follows.
    Step 1:   Creating Interest
    Step 2:   Provide knowledge to students on each of the 5 experimental worksheets. Divided into 1 worksheet per week.

Step 3: Practice readiness for practice. The instructor will distribute experimental worksheets each time for students to study the working principles of various types of motor connections.

Step 4: Train your ability to practice. The instructor divides the students into groups of 2-3 people, totaling 7 groups. Then the students complete an experimental worksheet and the instructor demonstrates through a virtual reality program. (Simurelay) where students conduct experiments by using circuits from worksheets to experiment through a virtual reality program (Simurelay) and compare with the results of manual training.

Step 5: Summary of the lesson: The teacher works to summarize the content by summarizing each worksheet separately and having the students explain the principles of their work.

Step 6: Measure students' ability to practice connecting circuits from all 5 experimental worksheets.

3. The overall quality of learning management activities is at a good level (mean = 4.50, S.D. = 0.81). When considering each aspect, it was found that the level was excellent level in every aspect, with the aspect having the highest average. From highest to lowest, the top 3 are: "Learning media (mean = 4.75, S.D. =0.38), followed by the learning activities aspect (mean = 4.73, S.D. =0.46) and the overall structure of the plan (mean = 4.53, S.D. =0.81) were considered consistent with the set assumptions.

4. Results of the study of the ability to operate the electric motor control circuit by hand. Shows the percentage of ability to operate the manual motor control circuit, each group, totaling 7 groups, as shown in Table 1.

Group	Target score (total 155)	Result		Percentage
		Pass	Not pass	
1	123	√		80.35
2	133	√		85.80
3	123	√		89.35
4	126	√		81.29
5	129	√		81.22
6	140	√		80.32
7	140	√		80.32
Groups that pass the criteria		7		82.60

Table 1: the percentage of ability to operate the manual motor control circuit by hand

The target group's score was calculated from the results of the evaluation of 5 worksheets and from the experiment of students with skills in operating electrical circuits to control motors by hand, passing the criteria, accounting for 82.60 percent. As for the target, there were 80 percent who passed the criteria, considered consistent with the assumptions specified. That is, after learning with Active Learning activities through a virtual reality program (Simurelay) to develop and develop skills in operating electrical circuits to control motors with hands, subject of electric motor control.

Acknowledgements

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Advantages and Disadvantages of AI in the EFL Classroom

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Abstract

Undoubtedly, the conversation around artificial intelligence (AI) has recently intensified, fostered by the rapid development of technology. Learning institutions have joined in the debate, with teachers and learners on the frontline of this conversation. This study particularly explores the direct impact of AI applications such as chatbots (ChatGPT), personalized learning experiences, and predictive analytics on EFL classroom learning, outlining AI's advantages and disadvantages on foreign language learners and their teachers. It employs a qualitative approach to data collection and screening, utilizing surveys on a sample of students at the university level. Evidently, from the study findings, AI can potentially improve learning, especially among students in EFL classrooms. However, there is concern about AI inhibiting the development of learners' research and critical thinking skills. Largely, the findings recognize AI's value in EFL classrooms but appeal for caution from teachers in its application. This study offers valuable insights into AI's impact on EFL classrooms and offers possible changes that could help in its successful integration into EFL teaching practice.

Keywords: Artificial Intelligence, Teachers, Learners, EFL Learning

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Introduction

The use of artificial intelligence (AI) technology in the educational sector has significantly increased over the last few years, and this trend is also present in EFL classrooms. Applications of AI that might improve language learning include chatbots, adaptive assessment, personalized learning environments, and predictive analytics (Sumakul et al., 2022). This article will investigate the effects of AI in EFL courses by weighing its benefits and drawbacks. It will examine how AI may boost language practice and feedback for learners of foreign languages and enhance learning results for these students. It will also highlight the possible disadvantages of AI, such as doubts about how it will affect research and critical thinking abilities, ethical issues with data protection, and the potential decline in human contact throughout the learning process. This article aims to provide helpful insights and suggestions for educators on successfully incorporating AI technologies into foreign language training by examining the efficacy of AI in the EFL classroom and outlining future developments in AI for language teaching.

Methods

Participants were Japanese L1 speakers, and they ranged between 20–22 years of age. All questions and explanations were in English. An anonymous and voluntary questionnaire was prepared and distributed among these students to determine their outlook on artificial intelligence (AI) technology. It was written in English, consisted of twenty-two items, and was developed as the instrument for data collection. The study was conducted mid-semester, during the spring of 2023.

Research Questions

The research was conducted to answer the following research questions:
      RQ1: What are the advantages of AI in EFL Classrooms?
      RQ2: What are the disadvantages of AI in EFL Classrooms?

Impact of AI in the EFL Classroom

Overview of AI Applications in EFL Classrooms

Artificial intelligence (AI) has been integrated into EFL classrooms via a variety of cutting-edge technologies that have the potential to transform language instruction completely. One such technology is AI-powered chatbots, like ChatGPT, that let language learners connect and get immediate feedback. These chatbots replicate actual conversation situations, giving students highly accessible practice opportunities and personalized language support (Jeon, 2021).

Adaptive testing is a different AI application popular in EFL courses. Using AI algorithms, adaptive testing systems may evaluate learners' competence levels and customize the testing process to meet their unique requirements. These systems provide a more accurate assessment of learners' language skills by dynamically modifying content and the difficulty of test questions depending on learners' replies. By examining learner data like performance, interests, and learning preferences, AI also makes it possible to personalize learning experiences. AI systems may provide specialized information, exercises, and suggestions by

identifying individual strengths and weaknesses. This promotes a customized language learning method that meets each student's requirements.

Additionally, learner data is used by AI-powered predictive analytics to estimate future performance and pinpoint possible improvement areas. By examining patterns and trends in students' learning behaviors, AI can provide insightful recommendations that help instructors modify their support and teaching methods, ultimately accelerating student development (Rudolph et al., 2023). There are exciting possibilities for language learning with these AI technologies in EFL classrooms. Immersive conversational practice, individualized learning opportunities, and more precise evaluations of language competency benefit language learners. However, since they have repercussions for students and instructors, it is crucial to consider the possible drawbacks of integrating AI into EFL courses alongside the potential benefits.

Advantages of AI in the EFL Classroom

Personalized Learning Experiences

The capacity to provide each student with a personalized learning experience is one of the significant benefits of using AI in EFL classrooms. AI algorithms, which analyze student data such as performance, interests, and learning preferences, can help to tailor material and activities to individual students (Vera, 2023). Due to this personalized approach, students may interact with resources relevant to their needs, interests, and learning preferences. Learners are more likely to remain motivated and advance in their language learning journey by getting information and activities that are relevant and appropriate for their level of skill. Additionally, AI-powered systems may provide students with tailored feedback, indicating areas for improvement and offering them specific coaching (De la Vall & Araya, 2023). This instant and detailed feedback encourages more effective learning and helps students quickly correct their weaknesses.

Enhanced Language Practice and Feedback

Chatbots and other AI tools in EFL classrooms promise to improve language practice and feedback. These AI-powered chatbots allow students to participate in engaging, realistic language discussions, allowing them to hone their speaking and listening abilities in a safe setting (Jeon, 2021). AI-powered chatbots provide students with genuine language usage experiences by imitating real-world communication situations, enhancing their capacity for comprehension and effective communication in various settings (Kim et al., 2021). Additionally, AI systems can provide learners with immediate, focused feedback while immediately detecting their mistakes and making recommendations for development. In addition to assisting students in real-time error correction, rapid feedback encourages students' language acquisition. EFL learners may benefit from opportunities to strengthen their language skills with individualized help by using AI for language practice and feedback, improving both competence and confidence in their language abilities.

Adaptive Testing

Due to its ability to customize tests for individual students, AI-driven adaptive testing offers significant benefits in EFL classrooms. These methods ensure that the assessment appropriately reflects the students' competence level by dynamically adjusting the test

questions' difficulty and substance depending on their replies. Instructors may use a personalized approach to ensure students are suitably challenged, preventing learners from becoming demotivated by overly challenging material or disinterested in simple assignments. Through adaptive testing, instructors may gather knowledge about their student's strengths and shortcomings to modify their teaching tactics, provide help where required, and enhance the learning process (Rudolph et al., 2023). The adaptive nature of AI-driven testing improves assessment accuracy and empowers instructors to provide more efficient and customized training to support language learning in the EFL classroom.

Availability of Language Resources

Students who take EFL classes with AI have access to a wealth of linguistic materials. Digital resources such as interactive exercises, authentic texts, multimedia resources, and language learning applications may all be found on platforms with AI capacity. These materials are accessible at any time and from any location, enabling students to pursue autonomous study outside the traditional classroom's boundaries (Voskoglou & Salem, 2020). AI technology makes it possible for students to study different language materials at their own speed, allowing self-directed learning and encouraging autonomy in the language learning process. Furthermore, the enormous variety of language materials enhances the learning process and allows students to investigate various subjects and situations, promoting a deeper comprehension of the language and culture.

Disadvantages of AI in the EFL Classroom

Limited Human Interaction

Despite the advantages of AI apps for language learning and assessment, it's critical to recognize that they may reduce face-to-face contact in EFL classrooms. For students to participate in genuine and meaningful dialogues, direct connection with instructors and peers is essential. AI chatbots can replicate discussions but cannot fully capture the subtleties and dynamics of interpersonal dialogue (Jeon, 2021). The capacity of learners to completely grasp the nuances of language, such as tone, body language, and contextual knowledge, might be hampered by the lack of face-to-face contact and nonverbal clues. Human connection offers a rich learning environment where students may practice active listening, meaning negotiation, and social interactions, improving communication abilities (Kim et al., 2021). Therefore, to provide thorough language learning experiences in the EFL classroom, it is crucial to establish a balance between AI applications and human engagement.

Risk of Overdependence

Although AI applications offer automatic aid and convenience, relying on them too much in the EFL classroom might lead to passive learning experiences. Learning takes on a more passive quality when AI often gives pre-generated information and automated feedback (De la Vall & Araya, 2023). Developing higher-order cognitive abilities requires active involvement, critical thinking, and problem-solving, all limited by this passive learning technique. The capacity of learners to undertake independent research, think critically, and analyze material outside of the predetermined algorithms and replies offered by AI might be hindered by an overreliance on AI systems (Vera, 2023). AI-based tools and activities that promote active engagement, independent thought, and student-driven inquiry must be balanced to provide a well-rounded education.

Ethical Concerns

AI in the EFL classroom raises significant ethical questions about data security and privacy. AI systems gather and examine learner data, including performance and personal data. To preserve the privacy and rights of students, it is crucial to secure this data against unauthorized access or breaches. Algorithmic biases are another issue wherein AI systems could unwittingly uphold injustices or favor certain groups over others (Wang et al., 2023). To solve this, it is crucial to ensure that AI applications are fair and inclusive, actively minimizing biases and encouraging equal opportunity for all learners. Maintaining trust, protecting student privacy, and upholding ethical norms are crucial when integrating AI into EFL classrooms. These qualities must be continually worked towards.

Technological Limitations and Accessibility

Technology restrictions and accessibility issues may arise when using AI in EFL classrooms. AI systems often depend on specialized infrastructure, such as steady internet connections and suitable hardware, which may not be accessible everywhere in educational settings. A lack of technological access may lead to inequities, preventing some students from using AI-powered tools and experiences. Additionally, using AI technology necessitates a learning curve for instructors and students, requiring time and effort to become used to new resources and modify teaching strategies (Vera, 2023). The learning process may be interfered with, and the smooth integration of AI in the EFL classroom might be hampered by technical issues or dissatisfaction with AI technologies. To successfully integrate AI into the EFL learning environment, it is vital to provide equal access to technology, to offer instructors and students the required assistance and training, and to resolve any technical concerns quickly.

Effectiveness of AI in the EFL Classroom

Empirical research has been undertaken to determine how well AI applications work in EFL classrooms. These studies examine how AI affects language acquisition abilities, including speaking, listening, reading, and writing. Personalized learning platforms, adaptive testing environments, and other technologies have all been studied by researchers. This research gathers information on learners' performance, engagement, and contentment and uses it to draw meaningful conclusions about the efficiency of AI in promoting language learning and enhancing learning outcomes. Empirical studies help us learn how AI may be best used in EFL classrooms via careful study and assessment.

The primary goal of assessing AI's effects on language learning outcomes is to assess the extent to which AI applications improve learners' competence and linguistic growth. Researchers assess learners' language proficiency before and after participating in AI-based treatments, comparing their development to that of students who received conventional classroom instruction (Wang et al., 2023). Language learners' performance, fluency, accuracy, and general language competency are assessed through summative and formative language tests. Additionally, the assessment considers variables like learner satisfaction, engagement, and motivation. Researchers learn more about the efficacy of AI in boosting language learning outcomes and its possible benefits over traditional teaching methods by analyzing the data gathered (Rudolph et al., 2023).

Comparative research has been done to determine how well AI compares to conventional EFL teaching techniques. These studies examine how students who use AI apps and those

who get conventional classroom teaching differ in their learning processes and results. Students' motivation, engagement, retention of information, and overall language ability are compared by researchers. These studies highlight AI's distinctive benefits, such as personalized learning experiences, adaptive evaluations, and fast feedback, by evaluating the strengths and disadvantages of both methodologies (Rudolph et al., 2023). They also emphasize the advantages of conventional teaching techniques, such as one-on-one instruction, instructor direction, and group projects. Comparative studies help to clarify the potential of AI as a supplemental tool in the EFL classroom and provide information on how it may be successfully incorporated alongside conventional teaching techniques.

We comprehend AI's efficacy in EFL classrooms by analyzing empirical data, assessing language learning results, and comparing it with conventional teaching approaches. These conclusions assist educators in making well-informed choices about incorporating AI technologies by pointing them toward pedagogically sound procedures that enhance language learning encounters and foster student success.

Future Trends in AI for EFL Teaching

As it continues to develop, AI technology has significant potential to offer new opportunities in the field of EFL education. AI systems will be able to comprehend and produce language more like that of humans due to developments in natural language processing and creation. As a result, AI chatbots will have better skills, allowing more complex and engaging dialogues with students (Sumakul et al., 2022). Additionally, it is anticipated that adaptive and personalized learning platforms will develop further. These platforms will use AI algorithms to provide customized exercises, assessments, and information depending on the requirements of particular learners. This tailored method will raise interest and improve language learning results. A further development in AI-driven EFL instruction is the integration of apps for virtual reality (VR) and augmented reality (AR) (Sumakul et al., 2022). With the help of VR and AR, language learners may practice in simulated real-life settings and discover cultural backgrounds in immersive learning environments. Given these developments in AI technology, the potential for improving language learning experiences and encouraging student autonomy and engagement is enormous.

Future advancements in AI-based EFL instruction will substantially impact instructors and students. Students will gain more access to personalized and adaptive learning opportunities tailored to their unique requirements, preferences, and learning preferences. Immersive VR and AR environments that enable real-world language practice and cultural discovery may benefit learners (De la Vall & Araya, 2023). Language learning may be made more successful and efficient using AI technology that can continuously give feedback, monitor progress, and make tailored suggestions. AI-powered solutions for instructors may help with lesson preparation, give insights into student performance, and make tailored suggestions for differentiated education.

However, future AI breakthroughs in the EFL classroom also have difficulties and issues to consider. Teachers must acquire the essential skills and expertise to incorporate AI technology into their teaching practices successfully (Vogt & Flindt, 2023). They must also address moral concerns like data privacy, algorithmic biases, and AI-human balance. Access to AI technology and infrastructure must be equitable to avoid learning disparities.

Recommendations for Educators

Strategies for Integrating AI in EFL Classrooms

AI technology should be used in EFL courses using the following methods. First, balance AI and traditional teaching methods. AI has numerous benefits, but human interaction still offers the best ways to learn (Voskoglou & Salem, 2020). To ensure students have adequate chances for direct interaction and collaboration, classroom activities may be augmented by AI technology. Second, professors should advise students about AI usage. This involves offering AI platform users precise instructions, assistance on effective usage, and supporting learner autonomy and responsibility. Finally, educators should stress study and analysis (Pokrivcakova, 2019). While AI may provide quick solutions and feedback, students must have the capacity for independent study, critical thought, and information evaluation. This may be accomplished by giving learners research-based assignments, fostering critical thinking, and providing instruction on how to use AI resources effectively.

Professional Development for Teachers in AI Implementation

Teachers should obtain sufficient professional development in AI implementation to properly integrate AI technology in EFL classrooms. First, instructors need to get training on AI tools and technology. Workshops, webinars, and courses that introduce instructors to the capabilities and uses of AI systems in language learning may be included in this training. Teachers must acquire the technical know-how required to traverse AI platforms with ease and effortlessly incorporate them into their pedagogical practices (Vogt & Flindt, 2023). Second, educators should be trained on ethical issues and data privacy. They must be aware of the effects of using AI technology, such as how crucial it is to safeguard learner data and deal with algorithmic biases. The best practices for protecting data protection, gaining permission, and upholding equity and inclusion in AI-based activities should be made known to teachers (Pokrivcakova, 2019). Last but not least, professional learning groups, conferences, and online forums may promote educator cooperation and the exchange of best practices. This enables educators to exchange successful practices, gain insight from one another's experiences, and collaboratively investigate the useful application of AI technology in the EFL classroom. By following these suggestions, teachers may successfully incorporate AI technologies into the EFL classroom, making the most of their advantages while ameliorating their drawbacks and ensuring students have a balanced and educational experience.

Limitations of the Study

There are several limitations to the present study. First, data were only collected from four classes therefore, the size of the research is limited. Second, the data were collected in the mid-semester. Regular reflections throughout the year may reveal other information. Third, all questions and reflections were written by students in English. If they were allowed to write in Japanese, they might be better able to articulate their feelings.

Conclusion

AI offers both benefits and drawbacks in EFL lessons. AI tools that provide personalized learning, improved language practice, focused feedback, and accurate assessments include chatbots, adaptive testing, and personalized learning experiences. However, there are issues

with the lack of human contact, the danger of dependency, moral issues, and technology constraints. Continuous research and development are essential if AI is to be used to its greatest potential in EFL classrooms. To ensure that AI tools are pedagogically sound and in line with best practices in language education, more research should be done to examine the efficacy and influence of AI on language learning outcomes. AI can improve language learning by providing individualized assistance, adaptive learning opportunities, and immersive language practice. In the EFL classroom, teachers may use AI technology to empower students and support their language growth by finding a balance between AI and human engagement.

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Virtual vs. Conventional Internship:
Its Impact on University Students and Fresh Graduate's Employability Level

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Abstract

The COVID-19 pandemic impacted various aspects of people's life. In the education aspect, the COVID-19 pandemic has changed learning methods from face-to-face to online via Zoom or similar platforms (Feldman, 2021). At the same time, there is a need for students and recent university graduates to develop skills to enter the workforce despite the pandemic challenges. This study aimed to explore students' employability in different internship programs. Through a quantitative approach, this research had two groups of participants who had joined virtual internships and conventional internship programs. The characteristics of virtual apprentice participants are university students or fresh graduates who have attended a virtual internship program at least once. Meanwhile, conventional internships are students who have participated in a conventional internship program at least once in any company or institution. Employability in this study consisted of four aspects: independent study, problem-solving, creativity, and communication. These four aspects are taken based on the employability aspects developed by Orji (2013). The situational Judgment Test (SJT) format minimizes social desirability. This study recruited 67 participants data from two groups with virtual and conventional internships. Results showed no significant employability score difference between participants who joined virtual and conventional internship programs. This result implied that virtual internship programs might be as effective as conventional ones in developing employability.

Keywords: Employability, University Students, Virtual Internship

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Introduction

The COVID-19 pandemic impacted various aspects of people's life. In the education aspect, the COVID-19 pandemic has changed learning methods from face-to-face to online via Zoom or similar platforms (Feldman, 2021). Employees have also experienced this change in various circumstances; before the pandemic, employees generally worked from the office face to face. However, after the pandemic, many companies have implemented policies to work remotely or what is known as remote working.

At the same time, there is a need for students and recent university graduates to develop skills to enter the workforce. Students commonly use various ways recent graduates of tertiary institutions to improve their skills, including attending training, short courses, and apprenticeship programs. In Indonesia, the government has implemented *Magang Merdeka,* an internship program that college students should take as one of the requirements to graduate from college (Ministry of Education Culture Research and Technology, Republic of Indonesia, 2022). In addition, many universities in Indonesia have also implemented internships as a requirement to earn a bachelor's degree. Therefore, the demand for internship experience has increased as policies are implemented in most local universities.

On the other hand, many challenges are also faced by students and new graduates to gain internship experience. Many companies cannot survive after the COVID-19 outbreak, so the number of available internships is limited. Besides, job opportunities at companies are limited in big cities such as Jakarta. Students in other cities must compete and do more to attain internship experience relevant to their career aspirations.

However, the Adult Education and Human Resource Development (AEHRD) field sees the prospect of changing apprenticeship activities from conventional apprenticeships to virtual internships online and remotely. The exciting thing is that the virtual internship program was implemented before the COVID-19 pandemic. On the other hand, the implementation of virtual internships before the COVID-19 pandemic was not because of physical workplace closures and mobility restrictions (Feldman, 2021).

Research from Mihali (2006) found that internship programs can help students who are still in college to develop essential skills needed in the world of work, such as communication, time management, self-confidence, and self-motivation, which are very important for getting and keeping a job–employability. One of the literature's most widely used definitions of employability (Bridgstock 2009; Jackson 2013) focuses on identifying the "right" combination of skills, attitudes, and individual characteristics that may improve graduate employment opportunities.

This initiative is crucial because virtual internships can help apprentices gain work experience with employees as desired, regardless of location, people with disabilities, or other responsibilities such as family (Jeske & Axtell, 2014). On the other hand, the effectiveness of the virtual internship program in developing the skills needed in the world of work has yet to be widely studied, especially in Indonesia. AlGhamdi (2022) found that virtual apprenticeship programs that are carried out effectively with the right program and adequate infrastructure can provide the same benefits as traditional apprenticeships. On the other hand, the apprentice's desire to learn and the supervisor's role become important during the internship. If this is done, virtual apprentices can obtain similar benefits to their career development from the experience gained during virtual apprenticeships (Jeske, 2022).

With various types of internships, exploring how effective internship programs are on employability in Indonesia's student population has become more crucial for today and the future. Therefore, this research aims to answer whether internship programs can provide effective output in improving the skills of prospective workers.

Participants

This study had two participant groups: virtual apprentices and convention apprentices. The characteristics of virtual apprentice participants are university students or fresh graduates who have attended a virtual internship program at least once. Meanwhile, conventional apprentices are students who have participated in a conventional internship program at least once in any company or institution.

The controlled variables are age (minimum age 18 years old) and working experience (should not have prior working experience). The recruitment of apprentices was carried out using the accidental sampling method. Meanwhile, virtual apprentices were recruited using a purposive sampling method of apprentices at various institutions providing virtual internships.

Instruments

The employability instrument used in this study was developed by Geshica and Zhafira (2023). This scale consists of four aspects: independent study, problem-solving, creativity, and communication. These four aspects are taken based on the employability aspects developed by Orji (2013). Researchers only used four of the ten aspects of employability due to these four aspects being the most relevant to conventional apprenticeship conditions and virtual internships. The situational Judgment Test (SJT) format minimizes social desirability.

SJT is a test that describes a problem or critical situation to identify whether the individual concerned can overcome it (Patterson et al., 2012). Developing the SJT consists of three stages: item creation, response options, format creation, and answer key selection. This instrument consists of 20 items with a score range of 20-100, where the higher the score represents, the higher the level of employability a person has.

Data Collection and Analysis

Data was collected online due to its effectiveness and reachability. All data were obtained in approximately one month. This process collected 67 participants' data from two groups (virtual and conventional internships). Moreover this study used several analysis techniques, such as descriptive analysis, reliability using internal consistency, and item-rest correlation. Moreover, multivariate statistics were performed to answer the research question: t-tests, ANOVA, and descriptive analysis. These analyses were performed using JAMOVI software version 2.3.21.

Descriptive Analysis

This study involved 67 participants with various backgrounds in terms of university and major. The description of the participants' characteristics can be seen in Table 1.

Table 1: *The Result of Descriptive Analysis*

Characteristics	F	Percentage	Characteristics	F	Percentage
Age			Student status		
18-22	43	64%	University student	31	46%
23-27	22	33%	Fresh graduate	36	54%
>27	2	3%			
GPA			Field of internship		
3.00-3.50	20	30%	Digital	32	48%
3.51-4.00	47	70%	Non-digital	35	52%
Age			Student status		
18-22	43	64%	University student	31	46%
23-27	22	33%	Fresh graduate	36	54%
>27	2	3%			
GPA			Field of internship		
3.00-3.50	20	30%	Digital	32	48%
3.51-4.00	47	70%	Non-digital	35	52%
Frequency of internship			Total duration		
			1-3 months	55	82%
Once	47	70%	4-6 months	10	15%
Twice	18	27%	7-12 months	2	3%
Three times	2	3%			

From the table above, the majority of participants' age range was 18-22 years old, had GPA more than 3.50, and currently pursuing a bachelor's degree. A score categorization was also computed to get a holistic view of participants' employability levels. The score categorization used was hypothetic categorization from Azwar (2012). Hypothetical categorization was chosen due to the relatively small number of participants. The computation can be seen in Table 2.

Table 2: *The Score Interpretation and Categorization*

Categorization Reference	Score Categorization	Interpretation	F (%)
$\mu \leq -1.5\sigma$	>64	Very low	5 (7%)
$-1.5\sigma < \mu \leq -0.5\sigma$	64-70	Low	6 (9%)
$-0.5\sigma < \mu \leq +0.5\sigma$	71-76	Average	31 (46%)
$+0.5\sigma < \mu \leq +1.5\sigma$	77-85	High	25 (37%)
$+1.5\sigma < \mu$	>85	Very high	0 (0%)

To calculate the score categorization, firstly the computation of mean and standard deviation were performed. According to these analyses, the mean employability score was 74, and the standard deviation of 7. After obtaining these scores, the calculation of score categorization

showed that most participants had average employability levels. However, none of the participants had a very high score in employability.

Inferential Analysis

Inferential analysis using ANOVA was performed to explore the factors contributing to employability. The result of the t-test can be seen in Table 3.

Table 3: *The Result of the t-test*

		Statistic	df	p
TOTAL	Student's t	-1.50[a]	65.0	0.139

Note. $H_a \mu_1 \neq \mu_2$

[a] Levene's test is significant (p < .05), suggesting a violation of the assumption of equal variances

However, the mean group comparation can be seen in Table 4.

Table 4: *Mean Group Comparation*

	Group	N	Mean	Median	SD	SE
TOTAL	1	32	72.4	75.0	8.32	1.47
	2	35	74.8	75.0	4.33	0.731

Results showed no significant employability score difference between participants who joined virtual (M = 72.4, SD = 8.32) and conventional internship programs (M = 74.8, SD = 4.33), t(65) = -1.50, *p* = 0.139. This result implied that virtual internship programs might be as effective as conventional ones in developing employability.

Discussion

Previous research has proven how internship experiences helped students and graduates obtain the necessary skills to enter the workplace. On the other hand, the government encourages college students to earn internship experience before graduation. Therefore, internship experience becomes more necessary. However, internships are limited in bigger cities and not enough compared to the number of college students who want to become interns.

Therefore, there is a need to fill the gap between available internship opportunities and college students who need to gain internship experience. Before the COVID-19 pandemic, many companies implemented remote working options for employees to enable employees from other cities, even countries, to work. Moreover, remote working has become more popular even after the endemic pandemic. Hence, more companies have engaged with interns and entry-level employees virtually. As virtual work becomes more common, virtual internships could be considered an option to fill the gap in internship opportunities for students and fresh graduates.

This research also proved that there is no significant employability score difference between participants who joined virtual and conventional internship programs. This implied that virtual internship programs might be as effective as conventional ones in developing

employability. Hence, students, fresh graduates, and universities might consider virtual internships an option to enhance employability and become more work-ready.

Although the result is quite important for enriching the knowledge about both types of internships, this current study has several limitations. Firstly, the sample size was relatively small, so it might not be adequate to generalize the results. Secondly, it is crucial to randomly select participants to ensure that the employability score before the internship is comparable.

Conclusion

Internship experience is a necessary experience for college students and graduates before entering the workplace. There are also many ways to sharpen skills and enhance employability to become well-rounded individuals. Virtual internships could be seen as an opportunity to develop employability to increase students' and fresh graduates' work readiness.

Acknowledgment

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The Information of Workplaces From Opinions of Graduated Students Attended the Cooperative Education in the Program of Printing and Packaging Technology, King Mongkut's University of Technology Thonburi

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Abstract

The objectives of the routine-to research (R2R) were to survey the information and opinions from the graduated students who had experiences from attending the cooperative education program, and to provide the database of the workplaces for the undergraduate students in next generations after determining the qualifications for selection. The online questionnaire was created using google form and the link was sent to 150 graduated students of this program by using the line group connection. The satisfaction was evaluated in 5 rating scale from 1, very poor, to 5, very good in three main topics: Readiness and Collaboration, Research Project Support, and Mentor or Advisor Providing. The feedback data with Microsoft Excel program were analyzed using descriptive statistics at the univariate level. The feedback responses of 50% of samples were obtained from 3 generations from 2020, 2021 and 2022, getting the information of total 40 workplaces categorized into 4 types, Design or Graphic Houses, Offset Printing Houses, Packaging Manufacturers, and Suppliers and Services. The results showed that a high number of the design or graphic houses, the suppliers and services, and the packaging manufacturers were very good in mentor and advisor providing. The satisfaction of graduated students in the readiness and collaboration, and research project support of the design or graphic houses and the suppliers and services were high. The workplaces type of design or graphic houses were the most appropriate for internship, and the suppliers and services were more appropriate than the offset printing houses and packaging manufacturers, respectively.

Keywords: Workplaces, Cooperative Education, Printing and Packaging Technology

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Introduction

The higher education institutions around the world use cooperative education to provide a broader range of degree studies in almost every field of study, making cooperative education graduates "know themselves, know people, and know their work" [1]. Cooperative Education is an education model that systematically switch classroom learning between practical work experience with a partnership of both public and private industrial enterprises and all involved sectors [2].

King Mongkut's University of Technology Thonburi saw the importance of internship as an educational tool for undergraduate students by providing the opportunity to practice and apply the knowledge gained in the classroom in the actual operation at the workplace. Therefore, the university has included the student's internship is part of the required subjects in the student's course [3]. In the program of B.Sc. Printing and Packaging Technology, the cooperative education was set for the 4th year students to have operation practice course in the workplaces in a period of one semester (16 weeks). The aims of this learning activity are to promote students to have more experience and professional skills, understand the behavior of workers and organization culture, able to work with other persons, and have a good attitude before graduating for further career.

As the responsible of the educational service support work, the routine-to research (R2R) was performed to develop the database of workplaces for our undergraduate students in the cooperative education. The questionnaire was then created to survey information and opinions from previous generations of undergraduate students who had experiences from attending their cooperative education program. Our purpose in this study was to get the information of workplace profiles to help the next generation of undergraduate students in choosing their suitable workplace for their internship.

Methodology

The quantitative research method used in this study was surveyed from three generations of graduate students who have experiences from attending the cooperative education practice of B.Sc. program in Printing and Packaging Technology, during the academic year 2020-2022. The online questionnaire as a tool of data collection was created with the google forms with open-end questions on the name of workplace, occupation after graduation and other suggestions, and closed-ended questions for the satisfaction evaluation in 5 rating scale from 1, very poor, to 5, very good. The opinion and satisfaction of the respondents on the workplaces in printing or packaging industries were evaluated as 5 rating scales in three main topics including sub-topics, as shown in Table 1.

Table 1: The contents for satisfaction evaluation in Questionnaire

Main Topics	Sub-topics
Readiness and Collaboration	- Facilities for operations - Welfare support - Advisors preparation - Work safety - Contact and Coordination - Training Plan
Research Project Support	- Correspondence to subject area - Scope of training work - Support by administrators
Mentor or Advisor Providing	- Professional in knowledge and experience - Available for advice - Pay attention in teaching and assignment - Assistance for work problems - Communication and knowledge transfer

The link of google form was sent to 150 graduated students of this program by using the line group connection. The feedback data with Microsoft Excel program were analyzed using descriptive statistics at the univariate level. The average rating scales (1-5) of any workplaces were classified in the range as follows.

4.51–5.00	Very good
3.51–4.50	Good
2.51–3.50	Fair
1.51–2.50	Poor
1.00 –1.50	Very poor

Results

The feedback responses of 75 graduated students (50% of samples) were obtained from 3 generations, those were 8 persons from 2020, 12 persons from 2021, and 55 persons from 2022. The information was summarized for total 40 workplaces relating to printing or packaging industries, which are categorized into 4 types, as follows.
1) Design or Graphic Houses: 3 workplaces from 9 graduated students.
2) Offset Printing Houses: 14 workplaces from 27 graduated students.
3) Packaging Manufacturers: 14 workplaces from 22 graduated students.
4) Suppliers and Services: 9 workplaces from 17 graduated students.

The data shows that the popular workplaces were offset printing houses and packaging manufacturers. The evaluation rating scales of each workplace type were analyzed in average scores to inform the quality level at each main topic and the number of workplaces was counted in percentage, as shown in Table 2.

Table 2: The number (%) of workplaces in each quality level for
4 workplace types in different 3 main topics

Workplace Types	Quality level	Readiness & Collaboration	Research Project Support	Mentor/Advisor Providing
1. Design or Graphic House	Very good	-	-	**66.66%**
	Good	**100%**	**100%**	33.33%
2. Offset Printing House	Very good	14.28%	21.42%	28.57%
	Good	**71.43%**	**42.86%**	**71.43%**
	Fair	14.28%	28.57%	-
	Poor	-	7.14%	-
3. Packaging Manufacturer	Very good	28.57%	21.42%	**50%**
	Good	**35.71%**	**42.86%**	21.42%
	Fair	28.57%	21.42%	21.42%
	Poor	-	7.14%	-
	Very poor	7.14%	7.14%	7.14%
4. Suppliers and Services	Very good	11.11%	33.33%	**66.66%**
	Good	**55.55%**	**44.44%**	33.33%
	Fair	33.33%	11.11%	-
	Poor	-	11.11%	-

For consideration in quantitative results, it was indicated that the high number of design or graphic houses, packaging manufacturers, and suppliers and services were very good in mentor and advisor providing. The offset printing houses were good in readiness and collaboration, and mentor/advisor providing. The poor level was observed in the topic of research project support for the offset printing houses, the packaging manufacturers, and the suppliers and services. After analysis, the very poor packaging manufacturer in all topics was then concerned to be delete from the list. In addition, the workplaces due to the poor quality in the topic of research project support should be revised to solve this problem for the undergraduate students in the next generation.

For consideration in qualitative results, the satisfaction evaluation of graduated students in scale from 1-5 was shown in Figure 1, which shows that the readiness and collaboration, including research project support of 1) design or graphic houses and 2) suppliers and services were slightly higher than those of 3) offset printing houses and 4) packaging manufacturers. For mentor or advisor providing, the suppliers and services were the best due to the staffs have knowledge in techniques and were available to transfer their knowledge of work to the students who practice as the technicians for customer services. The packaging manufacturers had the lowest score in terms of research project support and mentor/advisor providing due to the very tight of work.
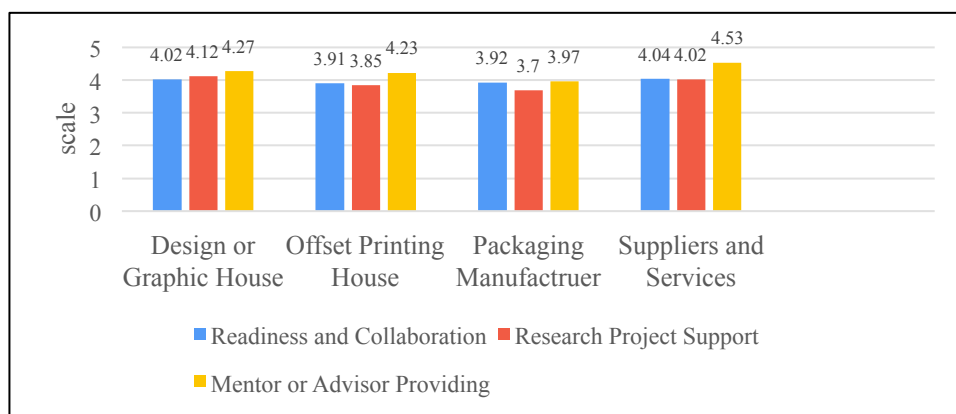
Figure 1: The satisfaction level of the graduated students to the workplaces

Table 3 shows that high number of the graduated students prefer to have internship at the design or graphic house and supplier and services. From the questions due to the occupation of graduated students after graduation, there were some persons are working in the same workplace after their internship, as shown in Table 3. For the open-end questions, there were some suggestions from the graduated students as shown in Table 4.

Table 3: Other information of the workplaces

Workplace Types	Number of workplaces satisfied for internship	Number of workplaces admit staffs after internship
Design or Graphic House	87.5%	87.5%
Offset Printing House	76%	48%
Packaging Manufacturer	51%	61.90%
Suppliers and Services	80%	60%

From Table 3, it was shown that the workplaces type of design or graphic houses were the most appropriate for internship and the suppliers and services are more appropriate than the offset printing houses and packaging manufacturers, respectively. However, the graduated students prefer to work as the designer and producer of packaging, due to the present trend, packaging industry requirement and the students' competencies in this program.

Table 4: The suggestions of the graduated students for some workplaces

Workplace Types	Advantages	Disadvantages	Area for Improvement
Design or Graphic House	The workplace type of design or graphic house is suitable for students who have competence in design, are creative and are up to date with current trends.	Travelling is inconvenient, and students going for internships should have their cars because most workplaces are far from the university.	The internship administrators should provide students with information about the travel to the workplace and inform the staff in that workplace about the design course that the student took in the curriculum.
Offset Printing House	It is more suitable for male students as it is easier to take safety precautions and management.	The tools and equipment used for practical training frequently malfunction and become inoperable. There is hard work and poor environmental management.	The internship administrators should survey the needs of both female and male students before allowing them to practice in an internship. The students should have their own equipment such as a laptop or computer notebook.
Packaging Manufacturer	Students gained knowledge from actual practice because there was a good working system.	When going to work, there always be heavy traffic. The students should have their vehicle. They should prepare to adapt to a new society and look for opportunities to learn new tasks.	The internship administrators should inform students to study the route for traveling to work and adapting to working society. When in doubt, always ask their mentor.
Suppliers and Services	Students who are interested in printing technology will gain a lot of knowledge because the staffs are very knowledgeable.	There is no variety in the internship, the work was the same repeatedly. During the rainy season, there was heavy flooding, and the travel was long. The students should stay in dormitories with a roommate to share the expenses.	The internship administrators should provide guidelines for practicing in the area of repair, and presentation of materials and equipment.

Other Information From Graduated Students

From the open-ended questions, the suggestions can be summarized as follows. Two workplace types; the design or graphic houses, and the suppliers and services were excellent in the topic of readiness and collaboration, due to good compensation, allowances, and the equipment or tools for students practice to ensuring the work efficiency.

In topic of research project support, the entrepreneurs of design or graphic houses were ready and willing to collaborate with students to have research and develop for their companies. In term of mentor or advisor providing, the staffs of suppliers and services were expert to effectively provide guidance, suggestion, and knowledge transfer. The success key of internship is to apply the knowledge gained from the workplace for future occupation, income, living, and continue to benefit society.

Conclusion

This study was a routine to research (R2R) to develop the information for undergraduate students to determine the suitable workplace before application for internship in the cooperative education practice course of the B.Sc. Program in Printing and Packaging Technology at the Faculty of Industrial Education and Technology, King Mongkut's University of Technology Thonburi. The qualitative and quantitative results of the workplace was analyzed by survey on the opinion and satisfaction of the graduated students to the workplace that they had ever have a cooperative education practice. In this study, there were 40 workplaces, with a total of 75 respondents from 150 graduated students attending the cooperative education practice during 2020 to 2022.

For consideration in quantitative results, it was indicated that a high number of the design or graphic houses, the suppliers and services, and the packaging manufacturers were very good in mentor and advisor providing. For consideration in qualitative results, the satisfaction of graduated students in the readiness and collaboration, including research project support of the design or graphic houses and the suppliers and services, were also high. The workplaces type of design or graphic houses were the most appropriate for internship, and the suppliers and services were more appropriate than the offset printing houses and packaging manufacturers, respectively.

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Design of Challenge Based Learning Module for Developing Social and Digital Skills of Vocational Education Students in Thailand

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Abstract

The design of a learning module to achieve social and digital skills for students in the vocational education system in Thailand has been introduced. The module included online lessons for self-learning and onsite activities following the process of Challenge-based Learning (CBL) classified as 3 processes: engage process, investigate process, and act process. The online lessons were designed as the Definition of community, Digital wellness, Digital content creation with smartphones, Online marketing, Challenge-based Learning Details, and Project Accomplishment. Students learned these lessons before access to activities in the CBL process. The students were grouped and assigned to get the project theme from the community and investigate how to apply knowledge and vocational skills to assist the community. The CBL process was utilized as a project framework that students would get the project theme from the engage process, get the project procedures from the investigate process, and get project accomplishment from the act process. To ensure the effectiveness and efficiency of the learning process, an on-site mechanism has been developed to meet, support, and monitor CBL learning activities for 533 students from vocational colleges in Thailand. The students were grouped as A, B, C, D, E, and F to create the projects and all projects were designed to present the results through 3 minutes of digital clips. The results indicate that the students have received enhanced experiences including skills in critical thinking, emotional intelligence, social skills, social responsibility, readiness for change, and various preparedness and adaptability to changes.

Keywords: Learning Module, Challenge Based Learning, Online Learning, Digital Skill Development, Social Skill Development

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Introduction

Vocational education usually is set to prepare young Thai people to have the readiness to work as manpower in the workforce or labor market. This is an educational system that is different from fundamental education (high school level education) which focuses on preparing people with academic skills for continuing to get access to higher education. In Thailand, vocational education is divided into 2 levels (1) vocational certificates which have 3 study years for basic professional skills in many kinds of occupations for those who graduate from secondary schools, and (2) vocational diploma certificates which have 2 study years for advanced professional skills in many kinds of occupations for those who graduate from the vocational certificate level or high school. The goal of developing students in the vocational education system in the country at technical colleges is the professional skills that fit for needs of many kinds of occupations in the labor market. In the past, this focused only on how to develop students having enough professional skills with the necessary technical disciplines for working after graduated study in college. The learning activities are almost handled in the college and have only a short duration for work practicing in the real workplace. However, presently, expectations of vocational education have been changed. Due to it being related to many kinds of innovation both in development and application, then, it is not adequate for holding only professional skills, but 21st-century skills also must be developed for vocational students to be good and smart manpower in the era of everything around us is smart.

Digital skills are one of the best added-on skills for this era for technicians who are experts in professional skills. The filming skills are the best example of digital skills that students may apply to expand their professional skills to other opportunities in the works. Meanwhile, social skills such as global thinking or thinking for other skills are also necessary for vocational students due to, they have competencies in professional that are very good if they have the mind to do something for others with their professional.

Figure 1: Challenge Based Learning Framework [1]

To develop students to have both digital skills and social skills, the challenge-based learning (CBL) concept is a good way to be considered. This has been developed from the project-based learning (PjBL) concept that is designed to relate to real issues from the society of the community around students. The CBL will be applied as the learning base to develop the potential of students who must find and take the challenge to solve problem issues from the social or communities under the facilitation and coaching of teachers. The learning process for CBL can be divided into 3 steps as shown in Fig.1. The first step is "Engage" which is to

find out the problem issue from the society or communities around students covering house, school, or workplace. The second step is "Investigate" which is to find out what knowledge, skills, and materials are needed and what plans are needed to solve the defined problems. The third step is "Act" which is to find out how to implement the defined plan and what the conclusion of the solution is.

Therefore, this paper aims to design a learning module to develop the digital skills and social skills of vocational students in the vocational education system in Thailand based on the framework of challenge-based learning (CBL).

Design of the Proposed CBL Module
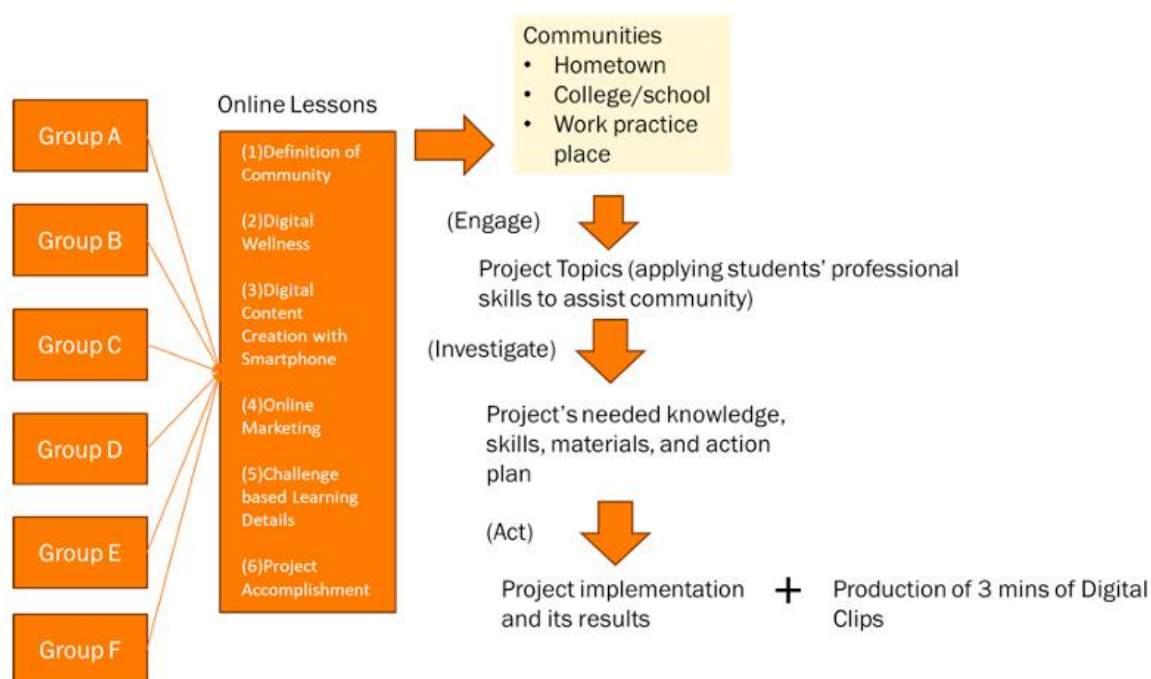
Figure 2: Proposed CBL Module

To design the learning module, the module learning outcome must be defined first. After learning the proposed module, students will be able to have (1) Awareness of social issues and the ability to apply their knowledge and skills to help society, (2) Empathy towards society and community, (3) Leadership and teamwork abilities, (4) Readiness for change due to changing social contexts, (5) Self-value recognition, and (6) Work opportunity. All these are the module learning outcomes. To achieve these outcomes, learning activities were designed by using learning technology and learning design as shown in Fig.2. To prepare students before access to the CBL processes, 6 necessary online lessons as (1) **Definition of Community** to understand what community is and how to understand others who are around us, (2) **Digital Wellness** to understand what useful and prohibition of social media are, (3) **Digital Content Creation with Smartphone** to understand how to create digital contents with a smartphone because it is the most convenient for students, (4) **Online Marketing** to know how to promote and sell products on online platforms, (5) **Challenge-based Learning Details** to understand each step of learning in the CBL, and (6) **Project Accomplishment** to know how to complete the project from initiation to the end were designed. Students will be grouped and all be assigned to learn designed online lessons that have a pretest and posttest

for each lesson so students can do self-evaluation. After self-online learning, each group of students will go to a community that here widely defined as a hometown, college/school, or work practice place to find out the social issue/problem. In the **Engage** process, students will discuss what issue they faced and what professional knowledge and skills they have for assisting the community as a group project topic. Next, in the **Investigate** process, students will find out what needed knowledge, skills, and materials are and define the action plan for implementing to accomplish the project. Finally, in the **Act** process, students will implement the action plan until they accomplish the project. To present the results of the project and to show how achievement for all module learning outcomes occurred, the production of 3 minutes of digital clips will be required. All these steps shown in Fig.2 are the proposed learning module and all learning evidence should be kept in the learning management system (LMS). Moreover, in developing students with the CBL processes, the teacher should act by facilitating or coaching skills.

Proposed Module Implementation

Figure 3: Proposed CBL Module during tryout
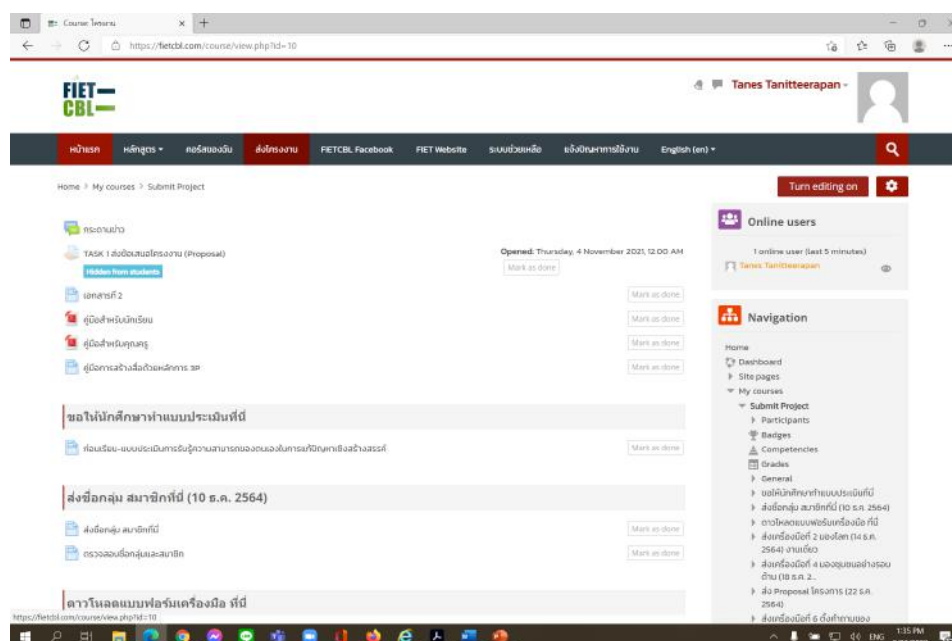
Figure 4: Designed LMS for keeping all learning evidence on the CBL processes

The module as shown in Fig.2 was implemented and to verify the idea, it was applied to the project population of 533 students from 15 vocational colleges around central Thailand.

Students were grouped across disciplines and institutions as A, B, C, D, E, and F total of 78 groups. In this, 70 teachers from 15 participated vocational colleges and 16 researchers from King Mongkut's University Thonburi were involved as facilitators or coaches in each process of the CBL. During the running process of the CBL module, online and onsite activities as shown in Fig.3 were applied. All assignments from each process of Engage, Investigate, and Act will be kept in LMS as shown in Fig.4. Here, students can access the online lessons and get teacher assignments for each step of learning in the CBL processes.

By applying the proposed module to develop the digital and social skills of 533 students, 78 projects were created and can be divided into 5 categories (1) 7 projects for agriculture works, (2) 13 projects for medical and health works, (3) 18 projects for waste energy and environment management, (4) 26 projects for life improvement, and (5) 14 projects for production and online marketing. All projects must present with 3 minutes of digital clip as shown in Fig.5.

Figure 5: Some digital clips from the proposed module

Module Achievement Evaluation
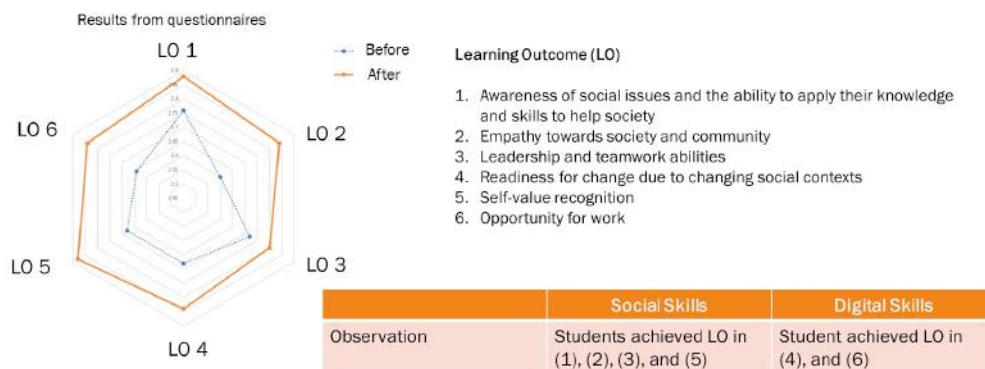
Figure 6: Results of Module Evaluation

To evaluate the achievement of the proposed module, students' behavior while running the module was applied by the researchers. As a result, students can achieve social skills with the learning outcomes on awareness of social issues and the ability to apply their knowledge and skills to help society, empathy toward society and community, leadership and teamwork abilities, and self-value recognition and can achieve digital skills with the learning outcomes on readiness for change due to changing social contexts, and work opportunity as shown in the table in Fig.6. Moreover, the questionnaires for evaluation of the student's learning achievement were applied to the teachers. These were applied to observe before and after learning with the proposed module as shown in Fig.6. From the figure, all learning outcomes achievements after learning were higher than before learning significantly.

Conclusion

A prototype of the design of a learning module for developing social skills and digital skills based on Challenge Based Learning (CBL) was introduced for the Vocational Education System. The module included online lessons for self-learning and onsite activities following the process of Challenge-based Learning (CBL) classified as 3 processes: engage process, investigate process, and act process. The online lessons were designed as the Definition of community, Digital wellness, Digital content creation with smartphones, Online marketing, Challenge-based Learning Details, and Project Accomplishment. Students learned these lessons before access to activities in the CBL process. The students were grouped and assigned to get the project theme from the community and investigate how to apply knowledge and vocational skills to assist the community. The designed module was run both online and onsite as a hybrid learning system. Teachers acted as facilitators or coaches in CBL process and students were developed to have achievement on social skills and digital skills with real issues from communities. Almost 80 projects were developed and created as 3 minutes of digital clips. The results indicate that the students have received enhanced experiences including skills in critical thinking, emotional intelligence, social skills, social responsibility, readiness for change, and various preparedness and adaptability to changes. This designed module might be useful for inspiring an idea to research on development of digital and social skills for Vocational students or others by using various digital education tools as based of development.

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Motivation in English Learning: A Case Study of an ESP Course in a Thai University

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Abstract

Running an ESP course which requires students to participate actively in the course, the students' ability to interact with topics a teacher raises in class is important. As a teacher, the researcher had noticed that some students enjoyed the class while some did not. This brought to an investigation to see what caused this phenomenon to happen so as to understand the condition and factors that affect students' motivation in learning English. Then, more appropriate lessons may likely be focused for further courses. The investigation was done by an open-ended questionnaire with 103 participants who studied an ESP course in a Thai university. Three main questions were studied: (1) Do you like learning English? (Why or why not); (2) How much motivation do you have in learning English? (What are factors encouraging you to learn English); and (3) How much confidence do you have in speaking English? (What are problems affecting your confidence in speaking English?) The results showed that 76.70% of the students like to study English; while 18.45% do not, and 4.85% neither like nor dislike. Most students love learning English because they want to go abroad and use English to communicate. For their motivation scale ranking from 0-10, the average is at 7.15 with the reason on the ability to communicate with foreigners at 31.08%. For problems affecting confidence in speaking English, the low self-esteem in speaking English is highly stated at 34.16%. The average of confidence in speaking English is at 4.85 (out of 10).

Keywords: Learning Motivation, Speaking Confidence, Factors Affecting in Speaking

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Introduction

In a university which there are a lot of mixed levels of students, to use English as a medium language is in consideration of each specific case. Teachers should be able to cover the content, language structures, vocabulary, and functions as planned in the teaching schedule; while English is encouraged to be used in an English class to make students get familiar of listening and speaking English. However, in some classes, where there are a lot of low to average English proficient students, to use English may cause some difficulties for some students in case their understanding may need more struggling than other students. This may lessen their learning motivation.

Students' motivation is one of important factors which support students' learning (Gardner and Lambert, 1959, 1972; Coleman, James, Galaczi, and Astruc, 2007; Lier, 1996). As Gardner (1982) mentioned that motivation consists of three components: effort (which is about the time the students spend in learning the language and their drive to learn English); desire (relevant to the students' need to be proficient in English); and affect (that is linked to their feeling to study English). So, to be successful in learning a language, students' motivation is important and necessary. In addition, motivation is categorized into two main types, namely integrative motivation and instrumental motivation. The integrative motivation aims to be able to integrate into the language; while the instrumental motivation tends to be able to use the language as functions to communicate. The teachers who teach English should make sure if the use of English does not destroy the students' learning motivation. As Deci and Ryan (1985) mentioned about the supportive learning situation can affect learning motivation.

This study, then, focuses on investigating students' preference in learning English to see if they like English or not. It is likely that students who love learning English tend to have high motivation in learning English than those who do not like to learn English. Liar (1996) mentioned that students who have motivation could achieve their goals in learning more than those who do not have. After that, motivation in learning English was investigated. This study focuses on students who study an ESP course. Most students were in low to average English proficiency. English was used a medium language in class. Moreover, their confidence in speaking English was also studied.

There are three main questions to be investigated:
1. Do you like learning English? (Why or why not)
2. How much motivation do you have in learning English? (What are factors encouraging you to learn English)
3. How much confidence do you have in speaking English? (What are problems affecting your confidence in speaking English?)

The data analysis was done by coding. This is to group similar ideas of answers together and count for frequency and calculate into percentage. Then, intra-coder or intra-rater technique was also employed in order to check for the reliability coefficient. The researcher took about 9 months to re-analyze the data again, then, compare the first and the second times of the data analysis.

The results of the study are presented according to the research questions respectively. The first part shows the findings from the coding, frequency, and percentage. The second part reveals the intra-coder reliability coefficient.

Part 1: Coding, Frequency, and Percentage

The below table is to answer **Question 1** "Do you like learning English?" Most of the students answered that they preferred learning English for 76.70%. About 18.45% said they did not like it and only 4.85% neither liked nor disliked learning English.

Items	Like	Dislike	Neither like nor dislike	Total
Numbers of Students	79	19	5	103
Percentage	76.70%	18.45%	4.85%	100%

Table 1: Students' preference in English learning

This part is linked from the above part about their preference in English learning. Here are supporting reasons why they liked or disliked learning English. It could be seen that most of the students who preferred to learn English answered that they wanted to go abroad and be able to communicate for about 23.08%. Another two reasons with equal numbers of percentage were because English was fun and they were aware of the importance of English, which were 13.84% both.

Items	Reasons	Frequency	%
1	Want to go abroad and be able to communicate	30	23.08%
2	Fun learning	18	13.84%
3	Be aware of importance of English	18	13.84%
4	Use for working	15	11.54%
5	Communicate with foreigners	11	8.46%
6	Use in daily life	11	8.46%
7	Use for practicing singing English songs	7	5.38%
8	Use to watch movies	6	4.62%
9	Value people who can use English	6	4.62%
10	Be attractive in learning English	6	4.62%
11	Effect from affective teacher	2	1.54%
	Total	**130**	**100%**

Table 2: Supporting reasons of their preference in English learning (Like)

Next part shows the supporting reasons of those students who disliked learning English. Most of them (38.70%) mentioned that English had too many points to remember (such as grammar points). The second top supporting reason was because of their self-indulgence for about 29.03%. They thought that they were not competent enough to learn English so they did not have strong drive to push themselves to learn English with their utmost effort.

Items	Reasons	Frequency	%
1	Too many points to remember e.g. grammar	12	38.70%
2	Self-indulgence	9	29.03%
3	Teacher's inappropriate style of teaching	3	9.68%
4	Low-self confidence	3	9.68%
5	Lack of lexical knowledge to be used leading to low intention in studying English	2	6.45%
6	No interest in English learning	1	3.23%
7	Dislike the under-pressure environment in studying	1	3.23%
	Total	**31**	**100%**

Table 3: Supporting reasons of their preference in English learning (Dislike)

The next table shows reasons of a number of students who neither liked nor disliked learning English. The top reason (40%) focused on the teacher's teaching style. So, this shows that teaching style could have an effect on students' preference in learning English in some aspect.

Items	Reasons	Frequency	%
1	Depend on the teacher and teaching style	2	40%
2	Realize that their English knowledge is ok (no problem in life)	1	20%
3	Just learn it because it's a must	1	20%
4	Just be able to learn it but feel so so	1	20%
	Total	**5**	**100%**

Table 4: Supporting reasons of their preference in English learning (Neither like nor dislike)

Next, the results from **Question 2** show how much motivation the students have in learning English. This was to let students rank their score from 0 to 10. The average scores were 7.15.

Score Rank (0 – 10)	Frequency	%
Score at **10**	10	9.71%
Score at **9**	11	10.68%
Score at **8**	25	24.27%
Score at **7**	22	21.36%
Score at **6**	15	14.56%
Score at **5**	13	12.62%
Score at **4**	7	6.80%
Score at **3**	0	0
Score at **2**	0	0
Score at **1**	0	0
Score at **0**	0	0
Total	**103**	**100%**

Table 5: Average score rank in learning English motivation

This part is to show lists of factors that encourage students to learn English. There were 11 lists of factors that the students mentioned. The top two factors were because English could help in communicating with foreigners for 31.08% while another factor focused on its use in working (28.38%).

Items	Factors	Frequency	%
1	It helps in communicating with foreigners.	46	31.08%
2	It helps in working.	42	28.38%
3	It helps in having good profiles.	16	10.81%
4	It helps in travelling.	14	9.46%
5	It helps in entertaining.	9	6.08%
6	It helps in everyday use.	7	4.73%
7	It helps in exploring new things.	5	3.38%
8	English is compulsory. I must learn it.	3	2.03%
9	Teachers and their teaching styles influence motivation.	3	2.03%
10	Students are motivated to learn English because they want to be like their idols.	2	1.35%
11	Students are motivated to learn English because of the environment they live in.	1	0.67%
	Total	**148**	**100%**

Table 6: Factors encouraging students to learn English

The next part focuses on **Question 3** which is about students' confidence in speaking English. The same as the previous part, the students had to rank their scores from 0 to 10 to give themselves scores in their confidence to speak English. The average score of all students was only 4.85 out of 10 which was very low, not even pass half of the full score. This shows that most students had low self confidence in speaking English regardless of their competency.

Score Rank (0 – 10)	Frequency	%
Score at **10**	1	0.97%
Score at **9**	1	0.97%
Score at **8**	3	2.91%
Score at **7**	11	10.68%
Score at **6**	15	14.56%
Score at **5**	33	32.04%
Score at **4**	23	22.33%
Score at **3**	8	7.78%
Score at **2**	3	2.91%
Score at **1**	3	2.91%
Score at **0**	2	1.94%
Total	**103**	**100%**

Table 7: Average score rank in speaking English

This part links to the above part about the confidence in English speaking of students. There were lists of problems that blocked the students from being able to speak English. The top three problems were their low self-image in their English proficiency (34.16%), limitation of vocabulary (22.28%), and their worry about accent (9.90%).

Items	Problems	Frequency	%
1	Low self-image in their English proficiency	69	34.16%
2	Limitation of vocabulary	45	22.28%
3	Worry about accent	20	9.90%
4	Lack of practice in English speaking	18	8.91%
5	Limitation of knowledge in sentence structure	14	6.93%
6	Lack of listening skill	14	6.93%
7	Worry about grammar	14	6.93%
8	Worry about pronunciation	7	3.47%
9	No interest in English	1	0.49%
Total		**202**	**100%**

Table 8: Problems affecting confidence in speaking English

After the presentation of the coding, frequency, and percentage in the above section, then, the next section shows the research findings with another method, which is the analysis of reliability coefficient. This method helps to double check about the reliability coefficient of the findings to see if the data analysis employed was reliable and acceptable in academic aspect or not.

Part 2: Intra-Coder Reliability Coefficient

> The **intra-coder reliability** test is displayed below:
>
> $$\frac{\textbf{Number of items coded the same in the first and second coding}}{\textbf{Number of items coded in the first coding}}$$

To answer **Question 1** about the students' preference in English learning, the students also gave reasons to support why they liked learning it. The first time, the researcher indicated 11 reasons; whereas, the second time of the data analysis, 9 reasons were found. Therefore, the reasons supporting student's preference in English learning were 9 reasons with the reliability coefficient of 0.82. Neuendorf, 2002 (p. 145) mentioned that "coefficients of .90 or more would be acceptable to all, for **.80 or more would be acceptable for most cases** and if it was below this point, there might be some inacceptable points to be discussed." So, in this part it means the finding is acceptable.

First time analysis: 11 reasons

Items	Reasons	Frequency	%
1	**Want to go abroad and be able to communicate**	**30**	**23.08%**
2	*Fun learning*	*18*	*13.84%*
3	Be aware of importance of English	18	13.84%
4	Use for working	15	11.54%
5	**Communicate with foreigners**	**11**	**8.46%**
6	Use in daily life	11	8.46%
7	Use for practicing singing English songs	7	5.38%
8	Use to watch movies	6	4.62%
9	Value people who can use English	6	4.62%
10	*Be attractive in learning English*	*6*	*4.62%*
11	Effect from affective teacher	2	1.54%
	Total	**130**	**100%**

Table 9: 1st time analysis (Question 1: Reasons why they liked learning English)

Second time analysis: 9 reasons

Items	Reasons	Frequency	%
1	**Want to go abroad and be able to communicate with foreigners**	**41**	**31.54%**
2	*Fun learning and be attractive in learning English*	*24*	*18.46%*
3	Be aware of importance of English	18	13.84%
4	Use for working	15	11.54%
5	Use in daily life	11	8.46%
6	Use for practicing singing English songs	7	5.38%
7	Use to watch movies	6	4.62%
8	Value people who can use English	6	4.62%
9	Effect from affective teacher	2	1.54%
	Total	**130**	**100%**

Table 10: 2nd time analysis (Question 1: Reasons why they liked learning English)

Intra-coder Reliability =

Analysis	1st time analysis	2nd time analysis
No. of Reasons	11	9

= 9/11 $\rightarrow$ **R = 0.82**

The next part is to answer **Question 2** about what factors encouraging the students to learn English. The first time of the analysis covered 11 factors; while the second time consisted of only 9 factors. The reliable coefficient of this part was 0.82 which is acceptable (Neuendorf, 2002).

First time analysis: 11 factors

Items	Factors	Frequency	%
1	**It helps in communicating with foreigners.**	**46**	**31.08%**
2	*It helps in working.*	*42*	*28.38%*
3	*It helps in having good profiles.*	*16*	*10.81%*
4	**It helps in travelling.**	**14**	**9.46%**
5	It helps in entertaining.	9	6.08%
6	It helps in everyday use.	7	4.73%
7	It helps in exploring new things.	5	3.38%
8	English is compulsory. I must learn it.	3	2.03%
9	Teachers and their teaching styles influence motivation.	3	2.03%
10	Students are motivated to learn English because they want to be like their idols.	2	1.35%
11	Students are motivated to learn English because of the environment they live in.	1	0.67%
	Total	**148**	**100%**

Table 11: 1st time analysis (Question 2: Factors encouraging the students to learn English)

Second time analysis: 9 factors

Items	Factors	Frequency	%
1	**It helps in communicating with foreigners and use in travelling**	**60**	**40.54%**
2	*It helps in working and have good profiles*	*58*	*39.19%*
3	It helps in entertaining.	9	6.08%
4	It helps in everyday use.	7	4.73%
5	It helps in exploring new things.	5	3.38%
6	English is compulsory. I must learn it.	3	2.03%
7	Teachers and their teaching styles influence motivation.	3	2.03%
8	Students are motivated to learn English because they want to be like their idols.	2	1.35%
9	Students are motivated to learn English because of the environment they live in.	1	0.67%
	Total	**148**	**100%**

Table 12: 2nd time analysis (Question 2: Factors encouraging the students to learn English)

Intra-coder Reliability =

Analysis	1st time analysis	2nd time analysis
No. of factors	11	9

= 9/11 → **R = 0.82**

This part shows **Question 3** about the problems indicated to affect confidence in speaking English. Both the first and the second times of the analysis, equal items of problems were coded. Therefore, the reliability coefficient was 1.00 which was mentioned that **"coefficients of .90 or more would be acceptable to all**, for **.80** or more would be acceptable for most cases and if it was below this point, there might be some inacceptable points to be discussed" (Neuendorf, 2002, p.145).

First time analysis: 9 Problems

Items	Problems	Frequency	%
1	Low self-image in their English proficiency	69	34.16%
2	Limitation of vocabulary	45	22.28%
3	Worry about accent	20	9.90%
4	Lack of practice in English speaking	18	8.91%
5	Limitation of knowledge in sentence structure	14	6.93%
6	Lack of listening skill	14	6.93%
7	Worry about grammar	14	6.93%
8	Worry about pronunciation	7	3.47%
9	No interest in English	1	0.49%
	Total	**202**	**100%**

Table 13: 1st time analysis (Question 3: Problem affecting confidence in speaking English)

Second time analysis: 9 Problems

Items	Problems	Frequency	%
1	Low self-image in their English proficiency	69	34.16%
2	Limitation of vocabulary	45	22.28%
3	Worry about accent	20	9.90%
4	Lack of practice in English speaking	18	8.91%
5	Limitation of knowledge in sentence structure	14	6.93%
6	Lack of listening skill	14	6.93%
7	Worry about grammar	14	6.93%
8	Worry about pronunciation	7	3.47%
9	No interest in English	1	0.49%
	Total	**202**	**100%**

Table 14: 2nd time analysis (Question 3: Problem affecting confidence in speaking English)

Intra-coder Reliability =

Analysis	1st time analysis	2nd time analysis
No. of problems	9	9

= 9/9 → **R = 1.00**

Conclusion

From the results of the study, it could be seen that most students, regardless of their English proficiency, preferred to study English because they would like to be able to communicate with other people. This is similar to Carrió-Pastor and Mestre Mestre (2014) which mention that generally most students have motivation to learn a language because they want to be able to use it (instrumental motivation) not to understand it (integrative motivation). So, from this finding, it can be implied that activities and practices in class should also focus more on language application, not just only language point to be memorized. An interesting point which was found in the study was that among students who neither liked nor disliked learning English mentioned that they would wait to decide if they like learning or not by considering the teachers' teaching style. This links to Phan (2010) that the teacher's support in English learning could have an effect on their learning motivation.

The reason most students mentioned for motivating them to learn English was about communication and for work purposes. This shows that they concern about English use as

functional instrument to help them in the future. English which was used as a medium language in class even if the majority of students were in low to average proficiency but from the finding, it showed that most of them preferred that the teacher used English. This might be because they could have a chance to practice their listening skills which could be useful in their work or personal purposes.

Referring to the above paragraph of the conclusion and discussion about the use of English in class; however, most students have low self-esteem in speaking English. They had low self perception on speaking skill. This could be seen from their average speaking score they chose to represent their speaking ability. Then, this could lead to the activity preparation in class that the teachers should find or create some kinds of activity which can help them increase their confidence and self esteem in speaking English with other people.

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Improvement of Data Management to Support Educational Quality Assurance of
a Faculty in University Using Digital Platform of Microsoft Teams

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Abstract
The educational quality assurance (QA) is the management and operation of universities to continuously improve the quality of students and graduate students. The purpose of this study is to improve the data management process for QA of the Faculty of Industrial Education and Technology, King Mongkut's University of Technology Thonburi, Thailand by using the Microsoft Teams. The principle of SIPOC model had been applied for brainstorming and gap analysis, showing that the main problem was an inefficiency in data management including data collecting, organizing, and accessing. The conventional process of information preparation was performed by requesting cooperation from relevant parties which was complicated and delayed, causing lately report submission as requirement. The process for data management of QA was then improved by analysis of data source, type, sequence, period, and connection before redesign using the Microsoft Teams platform. The channel of data collection was communicated with involved administrators to understand and access easily. There was also notification system for staffs to store information at the appropriate time by setting in the google calendar. The results have been follow-up by evaluating the satisfaction of users to the improved system using online questionnaire with 5-scale, showing that the system was good with the mean score of 4.1. The results of this study could enhance the systematic management of data collection, quickly and easily to find the information, reducing the process of QA report preparation. In addition, this procedure could be a good guideline for other practices of the faculty.

Keywords: Microsoft Teams Platform, Quality Assurance, SIPOC

Introduction

IQA stands for Internal Quality Assurance (IQA). IQA is the process of ensuring that the learning and qualifications in an educational environment, meet agreed quality standards. The aim of Internal Quality Assurance is to ensure that assessment practices are consistent, fair, and reliable. They need to result in valid and accurate assessments of learners' knowledge, skills, and understanding. IQA is an important component of the overall quality management system in the education and training sector. The job of the IQA is to oversee the quality assurance process of an organizations training program. The IQA is responsible for making sure that all the training delivered meets the necessary standards. These standards are set by both the training provider and awarding body. The IQA is also responsible for making sure that the assessors and trainers within the organization are trained to the required standards. This would be the organizations 'Lead IQA'. This role is also known as a Centre Lead or Quality manager. The specific job duties of an IQA may vary depending on the organization, but generally, an IQA's job may include the following: 1. developing and implementing quality assurance systems and processes. 2. ensuring that assessors and trainers are using valid and reliable assessment methods and techniques. 3. Monitoring the assessment practices of assessors and trainers to ensure they are consistent and fair. 4. Providing feedback and support to assessors and trainers to improve their assessment practices. 5. Reviewing assessment decisions to ensure they are accurate and valid. 6. Ensuring that all assessment practices are compliant with relevant policies, procedures, and regulations and 7. Maintaining accurate records and documentation of all quality assurance activities [1].

The Ministry of Higher Education, Science, Research, and Innovation (MHESI) has decided to endorse a guide for the examination of educational curricula and the inspection of educational operations to ensure the accreditation standards of higher education programs. This approval applies to both higher education institutions and the Office of the Permanent Secretary, Ministry of Higher Education, Science, Research, and Innovation. The Higher Education Quality Improvement Division (HEC) has developed an inspection manual for educational curricula and the assessment of educational operations to certify higher education standards. This curriculum is intended for higher education institutions in Thailand and is meant to serve as a guide for preparation in designing an educational curriculum that emphasizes learning outcomes and effectively meets the needs of stakeholders [2].

King Mongkut's University of Technology Thonburi (KMUTT), which operates under the jurisdiction of the Ministry of Higher Education, Science, Research, and Innovation (MHESI), is mandated to utilize a manual for the examination of academic programs and the inspection of management operations in studies. This manual serves as a guide for curriculum development and implementation at KMUTT. KMUTT has adopted a comprehensive policy with a primary focus on assessing the quality of its academic programs. The internal quality assurance for these programs involves two distinct criteria. The first criterion addresses a standardized approach to curriculum control, while the second criterion emphasizes standardized guidelines for curriculum development. Both of these criteria are overseen by the Ministry of Higher Education in Thailand.

The Faculty of Industrial Education and Technology at KMUTT offers a total of 16 programs, comprising 8 bachelor's degrees, 7 master's degrees, and 1 Doctor of Philosophy. Each program undergoes a rigorous quality assurance process to ensure adherence to standards and consistent quality. Programs are required to prepare a self-assessment report known as the 'Course Tracking Report' to report on course performance. These reports are

then submitted to the Educational Development and Services Office (EDS) at KMUTT—a central unit that supports the university's educational development. This unit collaborates with other departments, namely the Faculty Development Department, Teaching and Learning Development Department, and Organizational Development Department, to coordinate and manage educational development activities. In the course of quality assurance, there is a need for effective information exchange among various departments within and outside the faculty. A communication channel is established to facilitate the request for various documents necessary for compiling a comprehensive course follow-up report.

Based on the findings from previous operations, it was identified that the process of collecting documents and evidence for preparing the Course Monitoring and Review (CMR) report lacked systematic organization, and there was insufficient planning for data collection over time. This resulted in incomplete information. Additionally, the coordination in requesting information from various departments within the Faculty was slow, leading to delays in submitting CMR reports. These challenges have posed difficulties in meeting the quality assurance standards set by the authorities. The primary issue lies in the inefficiency of data management, encompassing both the collection and organization of data, as well as accessing information. The traditional data preparation process relies on complex and delayed cooperation from relevant parties. In the realm of higher education institution quality assurance operations, a more effective system is needed to facilitate document storage, prevent data loss, and eliminate delays in document retrieval or searching [3].

Consequently, this research aims to achieve two objectives to enhance educational quality assurance: to improve educational quality assurance, such as using digital platforms to improve educational quality assurance. And to increase the efficiency of educational quality assurance by planning data collection and data analysis of the Faculty of Industrial Education and Technology King Mongkut's University of Technology Thonburi.

Methodology

The methodology for this research involves a systematic approach to enhance the curriculum monitoring reports process within the Faculty of Industrial Education and Technology at King Mongkut's University of Technology Thonburi. The methodology consists of several key steps:

Step 1: Study of Operational Issues using the SIPOC Model

In this initial step, the SIPOC (Suppliers, Inputs, Process, Outputs, Customers) Model is employed to examine operational challenges and identify key elements and stakeholders in the curriculum monitoring reports process. For this research, Suppliers were Faculty Staff, Lecturers and Administrators.
1. Inputs were the correct and complete data such as the number of Lecturer's research, the number of students, Satisfactions of stakeholder, and more.
2. Process, Output was the center of quality assurance system.
3. Customers get the benefit of the quality assurance system.

Step 2: Study and Analysis of Main Document Data for Curriculum Monitoring Reports

This step involved a thorough study and analysis of the main document data required for the Curriculum Monitoring Reports. The focus was on understanding the necessary information based on the curriculum criteria set by the Ministry of Higher Education, Science, Research, and Innovation.

Step 3: Planning for Data Collection for Curriculum Monitoring Reports

A detailed planed for the data collection process is developed, ensuring connectivity with all departments within the Faculty of Industrial Education and Technology. Timeframes are defined to facilitate timely and comprehensive information gathering.

Step 4: Creating the System for Data Storage in Folders using Microsoft Teams Platform

This step involved the design of folders and structures for a dedicated data storage system for educational quality assurance. The Microsoft Teams platform is chosen for its accessibility and user-friendly features, aligning with quality assurance requirements.

Step 5: Conducting the Meeting for Information Dissemination

A meeting is organized to disseminate information to academic and supporting staff. Clear instructions are provided on the utilization of the new system.

Step 6: Implementing the Data Collection in Microsoft Teams

The data collection process is initiated within the Microsoft Teams platform according to the designed plan. Relevant personnel are guided and encouraged to actively participate in the data collection process.

Step 7: Evaluation of Satisfactions from Users

In this step, we will assess user satisfaction with the improvements made in data management to support educational quality assurance within a university faculty. The digital platform chosen for this purpose is Microsoft Teams.

Table 1: The contents for satisfaction evaluation in Questionnaire

Main Topics	Sub-topics
Data Access in System	- Information Dissemination for System - Understanding of System Operating - Easy and Convenience in Data Access
Usage of the Data Storage System in MS Teams	- Folder Setting and Providing for CMR - User-Friendliness of Platform - Systematic and Useful of Data - Efficiency Enhancement in Work Operations - Step Reduction for Information Request - Overall Satisfaction on Data Storage System

7.1 Statistical Measures Used for Evaluation:

7.2 Data Analysis Procedures:

7.2.1 Analysis of Survey Data:

Calculating the mean ($\bar{x}$) and standard deviation (SD) for quantitative analysis.

7.2.2 Scoring Based on Boonchom's Concept (2013):

Evaluating responses according to Boonchom's framework, where scores are assigned on a scale of 1 to 5, representing the levels of excellence, high satisfaction, moderate satisfaction, low satisfaction, and the lowest satisfaction, respectively.

7.2.3 Interpretation of Satisfaction Levels:

Interpreting the analysis results based on user satisfaction criteria:

Mean scores of 4.51–5.00 indicate the highest satisfaction.

Mean scores of 3.51–4.50 indicate high satisfaction.

Mean scores of 2.51–3.50 indicate moderate satisfaction.

Mean scores of 1.51–2.50 indicate low satisfaction.

Mean scores of 1.00–1.50 indicate the lowest satisfaction.

Results

Following this, Microsoft Teams was a tool for monitoring and follow-up for essential information encompassing financial data, policies, both current and graduated student information, research outputs from faculty members and students, and stakeholder satisfaction. Data from these aspects is collected from eight distinct groups, ensuring that it remains current and prepared for thorough analysis. The eight groups contributing to this comprehensive dataset are shown in Figure 1: Financial Group, Strategic Planning and Policy Group, Education Service Group, Academic Service Group, Human Resources Group, Quality Assurance Group, Student Development and Organizational Communication Group, and Research Group. This utilization of Microsoft Teams served to streamline communication, facilitate collaboration, and ensure that all relevant information was readily available for efficient decision-making and strategic planning within the research framework , as shown in Figure 1.
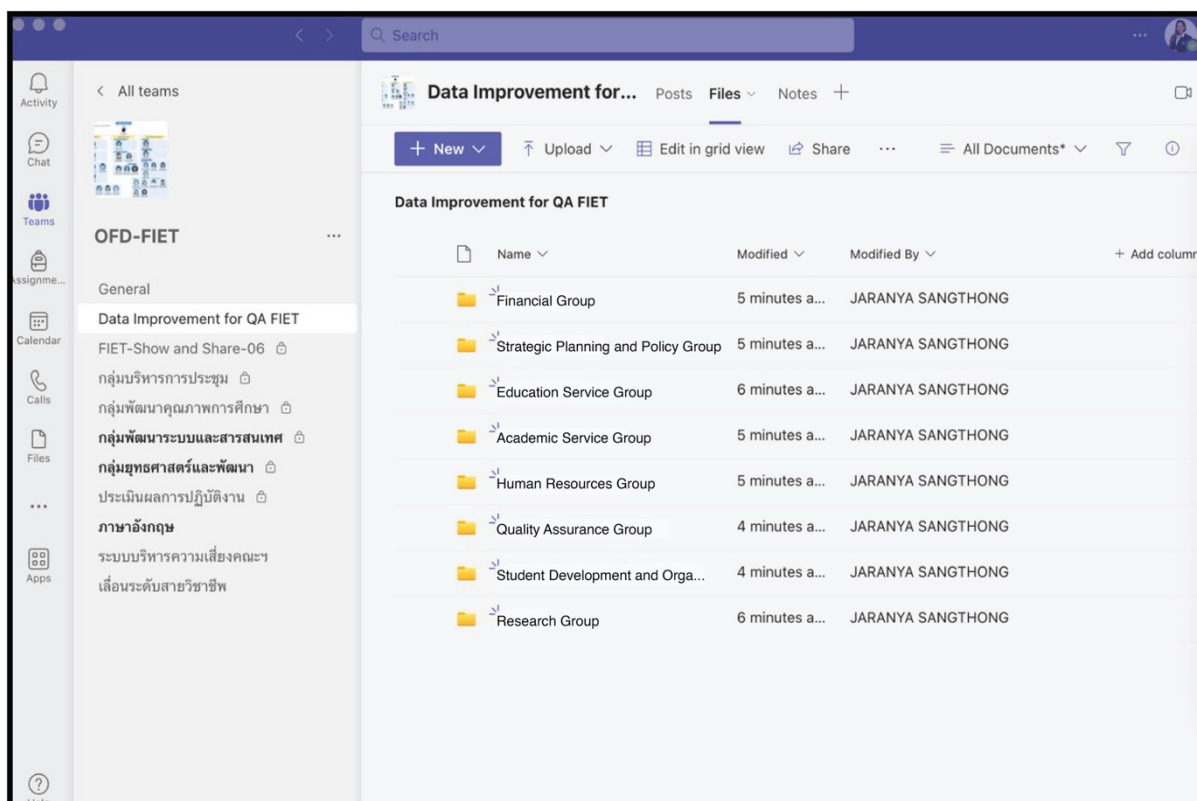
Figure 1: The Data Collection in Microsoft Teams from 8 Groups

Based on the satisfaction survey study on the improvement of Data Access in System to support educational quality assurance within a faculty at the university, utilizing the digital platform of Microsoft Teams, the research findings are summarized in Table 2.

Table 2: The Result Evaluate System Quality by Users for Data Access in System (N=20)

Data Access in System			
Title for evaluation	$\bar{x}$	**S.D.**	**Level of Satisfaction**
1. Information Dissemination for System	3.95	0.59	High
2. Understanding of System Operating	4.24	0.44	High
3. Easy and Convenience in Data Access	4.43	0.68	High
Overall Average Evaluation Result	**4.21**	**–**	**High**

The results revealed a heightened level of satisfaction across multiple dimensions, encompassing information dissemination, understanding of system operation, and ease of data access. The cumulative average evaluation result of 4.21 substantiates the conclusion that the implemented enhancements in data management through Microsoft Teams had significantly and positively influenced user satisfaction within the educational quality assurance framework. This indicated a successful integration of the digital platform in meeting user expectations and improving overall system quality in the academic setting.

Based on the satisfaction survey study on the improvement for Usage of the Data Storage System in MS Teams to support educational quality assurance within a faculty at the

university, utilizing the digital platform of Microsoft Teams, the research findings are summarized in Table 3.

Table 3: The Result Evaluate System Quality by User for Usage of
the Data Storage System in MS Teams (N=20)

Usage of the Data Storage System in MS Teams			
Title for evaluation	$\bar{x}$	**S.D.**	**Level of Satisfaction**
1. Folder Setting and Providing for CMR	4.22	0.62	High
2. User-Friendliness of Platform	4.86	0.36	Highest
3. Systematic and Useful of Data	4.57	0.6	Highest
4. Efficiency Enhancement in Work Operations	4.38	0.5	High
5. Step Reduction for Information Request	4.52	0.51	Highest
6. Overall Satisfaction on Data Storage System	4.33	0.48	High
Overall Average Evaluation Result	**4.44**	**-**	**High**

The results for the evaluation of the data storage system in Microsoft Teams demonstrate a high level of satisfaction among users across various dimensions. Users expressed satisfaction with folder settings for CMR, the user-friendliness of the platform, the systematic and useful nature of the data, efficiency enhancement in work operations, step reduction for information requests, and overall satisfaction with the data storage system. The cumulative average evaluation result of 4.44 further affirms the high satisfaction level, indicating the successful utilization of the data storage system in Microsoft Teams to meet user needs and enhance overall system quality in the academic context.

Conclusion

In conclusion, the implementation of digital platform-based data management, specifically utilizing Microsoft Teams, has proven to be instrumental in enhancing the quality assurance (QA) processes within a university faculty. The transition to a digital approach has facilitated the centralization of essential information, offering an efficient and easily accessible repository for Curriculum Monitoring Reports (CMR) preparation. This centralized approach ensured compliance with QA standards set by the faculty.

The success of this digital platform is underscored by its effectiveness in data analysis, aligning seamlessly with the requirements stipulated by the Ministry of Higher Education. By leveraging Microsoft Teams, the faculty had not only streamlined data management but had also demonstrated a commitment to meeting and exceeding educational quality assurance standards. This digital transformation stands as a testament to the adaptability and efficacy of modern technology in advancing educational administration and ensuring the continuous improvement of academic processes.

Suggestion

From this research, there were additional suggestions for developing a data management system to support educational quality assurance at the curriculum level according to the AUN-QA criteria as follows:

1. 1.Increase Publicity and Awareness: There should be an effort to increase awareness and publicity to attract more users to the system.
2. Continuous System Development: Continuous development and updates to the system were essential to ensure it remains current and aligned with evolving needs.
3. User Manual Development: The creation of a comprehensive user manual is crucial to guide users on how to effectively utilize the system.
4. Retrospective Data Enhancement: There should be a focus on adding retrospective data about students, providing a more comprehensive historical perspective.

These recommendations are designed to contribute to the ongoing improvement and evolution of the data management system, ensuring that it not only meets the current needs of users but also adapts to future requirements. By addressing these suggestions, the system could become more user-friendly, informative, and aligned with the quality assurance standards outlined by IQA.

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Education Inequality Within the European Union: A Spatial Statistics Approach

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Abstract

This study aims to investigate the spatial distribution of educational inequality within the European Union (EU) using a spatial statistics approach. Educational inequality remains a significant challenge for policymakers seeking to ensure equal opportunities for all EU citizens. By examining the spatial dimension of this issue, the study contributes to a deeper understanding of the geographical patterns of educational disparities across EU member states. The research employs spatial statistical techniques, including Exploratory Spatial Data Analysis (ESDA) to analyse data on educational indicators such as educational attainment levels and other relevant factors. These indicators are obtained from Eurostat for the most recent years available. The analysis will be carried out in the context of EU regions and we will focus on tertiary education. The findings reveal significant spatial variations in higher educational inequality across EU member states. ESDA techniques help identify clusters of regions with pronounced disparities in access to higher education, providing valuable insights for targeted policy interventions. Spatial autocorrelation analysis quantifies the extent of spatial dependence, highlighting areas where similar levels of higher educational inequality are clustered. Despite efforts to promote equal opportunities, disparities in access to higher education persist across member states. By analysing the spatial dimension of this issue, the study contributes to a comprehensive understanding of the geographical patterns of higher educational inequality in the EU.

Keywords: Tertiary Educational Attainment Level, Educational Inequality Within the European Union, Spatial Autocorrelation

Introduction

Education is a fundamental right and a crucial driver of economic growth and social well-being. Within the European Union (EU), the pursuit of equal educational opportunities for all citizens has been a central tenet of regional policy. The European Union has made significant strides in promoting education as a means of fostering social cohesion and economic development. In the context of the EU, The European Education Area strategic framework (Council of the European Union, 2021) was put in place to structure collaboration between EU Member States and key stakeholders to achieve their collective vision. As part of this collaboration, several goals related to education were set. For example, by 2030 at least 45% of 25-34-year-olds should have a higher education qualification. Despite the attention paid to the issue of education in the EU, educational inequality remains a persistent challenge, with disparities in educational attainment posing barriers to social mobility and economic development. Numerous studies have explored educational inequality within the EU, with a particular emphasis on gender disparities, socioeconomic factors, and policy interventions (e.g. Muszynska & Wedrowska, 2023; Palmisano et al., 2022). However, the spatial dimension of these disparities, along with their localized geographical patterns, has received comparatively less attention. Exploratory Spatial Data Analysis (ESDA) techniques offer valuable insights into the localized nature of educational inequality. This paper addresses the issue of gender-based disparities in tertiary educational attainment within the EU by employing Local Moran and Local Geary statistics. By focusing on local spatial patterns, we aim to gain a deeper understanding of the geographical distribution of educational disparities across EU member states.

Figure 1 (two box maps – Male and Female) illustrates spatial distribution of population by tertiary educational attainment level across the European regions separately for Male and Female. In addition, to point out the gender-based disparities in tertiary educational attainment, two boxplots were constructed (Male and Female). Local spatial patterns evident from Figure 1 indicate gender-based educational disparities. Significant differences in tertiary education between men and women are also confirmed by the comparison of boxplots presented in Figure 2.
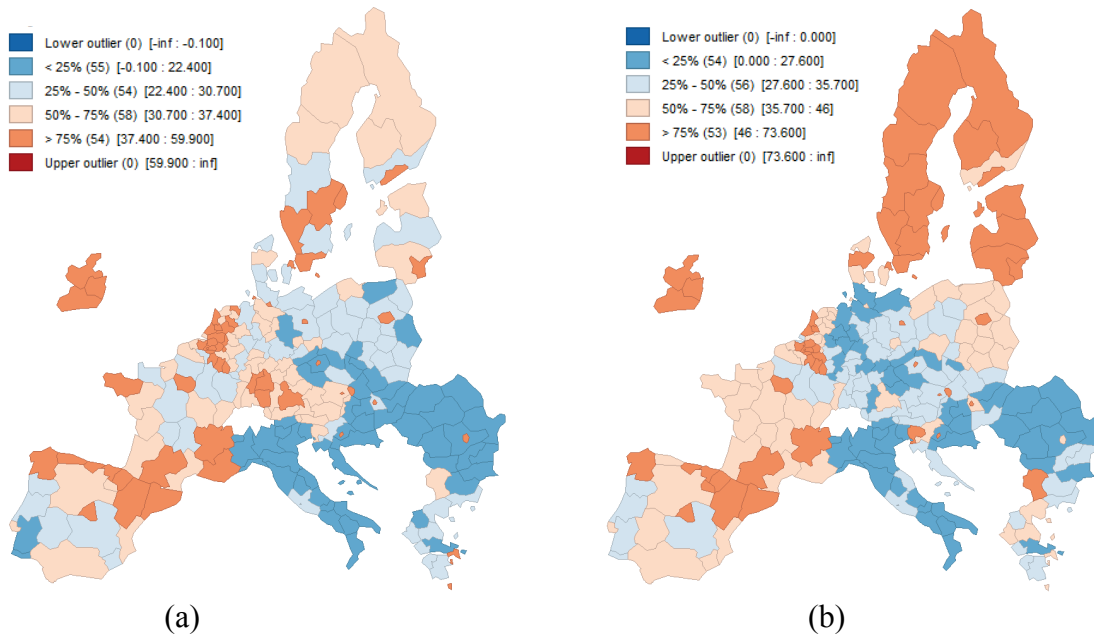
(a)   (b)

Figure 1: Box maps – population by tertiary educational attainment level (in %):
Male (a) and Female (b)
Source: author's elaboration in GeoDa
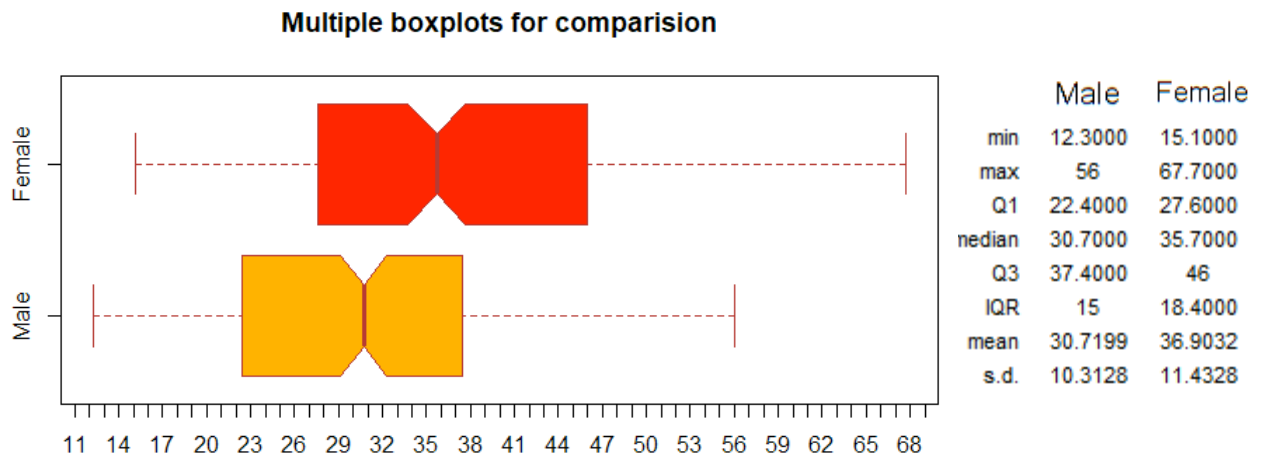
Figure 2: Multiple boxplots for comparison – population by tertiary educational
attainment level (in %): Male and Female.
Notes: Q1 – Fist quartile; Q3 – Third quartile; IQR – Interquartile range; s.d.
– Standard deviation
Source: author's elaboration in RStudio

2. Research Methods

In this section, we will briefly introduce the primary methodological framework underpinning our empirical analysis. Our empirical analysis relies on selected tools from Exploratory Spatial Data Analysis (ESDA). ESDA tools facilitate the assessment of spatial connections among observations, or spatial units (such as regions or countries). Spatial association, also known as spatial autocorrelation or spatial dependence, occurs when spatial units are not independent across the geographic area. This implies that neighbouring spatial

units are linked in some way. For a more in-depth exploration of this concept, we can refer to works like Getis (2010) or Anselin & Rey (2014).

ESDA encompasses various techniques that help us describe and visualize spatial distributions, identify unusual locations or spatial outliers, and uncover patterns of spatial association, clusters, or hotspots. To detect spatial autocorrelation, we can employ global and local indicators of spatial association, including well-known statistics like Moran's *I*, Getis-Ord statistics, and Geary's *C* statistic. These statistics are employed to examine the overall spatial autocorrelation of the variable of interest, essentially testing for general spatial trends across the entire area. Conversely, the local versions of these statistics allow for a more detailed analysis of local spatial patterns. In this paper, we specifically consider local versions of Moran's *I* and Geary's *C* statistics to measure spatial associations.

A local version of Moran's *I* statistic has been proposed by Anselin (1995) to further analyse local spatial patterns. In this case, particular location *i* is fixed. The local Moran's I_i statistic for the location *i* is defined as (Feldkircher, 2006):

$$I_i = \frac{\left(x_i - \bar{x}\right)}{\frac{1}{N}\sum_{k=1}^{N}\left(x_k - \bar{x}\right)^2}\sum_{j=1}^{N} w_{ij}\left(x_j - \bar{x}\right) \tag{1}$$

where x_i represents the underlying variable for region *i*, $\bar{x}$ represents the mean of the variable, *N* is the number of regions in the data set and w_{ij} are the elements of spatial weight matrix **W** of dimension $N \times N$ (for more details see, e.g., Getis, 2010 or Anselin & Rey, 2014). Each location (region) has an associated test statistic and spatial pattern can be visualised by cluster map. This graphical tool enables to detect which of the spatial unit has a statistically significant relationship with its neighbours, and show the type of relationship (*high-high* and *low-low* – positive spatial associations or *high-low*, *low-high* – negative spatial associations).

Next, we briefly discuss a local Geary statistic. As in its global counterpart (for more details see Anselin, 2019b), the focus is on squared differences, or, rather dissimilarity than similarity. Small values of the statistic suggest positive spatial autocorrelation (see Getis, 2010), whereas large values suggest negative spatial autocorrelation. The local Geary statistic takes on the following form:

$$G_i = \sum_{j} w_{ij}\left(x_i - x_j\right)^2 \tag{2}$$

where all variables were defined before.

Statistical inference can be based on a conditional permutation procedure and is interpreted in the same way as for, e.g., local Moran statistic or Getis Ord statistic. However, the interpretation of significant locations in terms of the type of association is not as straightforward for the local Geary as it is for the local Moran statistic. Closer examination (see formula (2)) reveals that this statistic consists of a weighted sum of the squared distance in attribute space for the geographical neighbours of observation *i*. The attribute similarity is not a cross-product, and thus has no direct correspondence with the slope in a scatter plot (Anselin, 2019a; Anselin, 2019b).

3. Empirical Results

The paper uses a set of data from the Eurostat regional statistical database (Eurostat, 2023) to perform spatial education inequality analysis. Database contains 221 European regions at NUTS 2 level (NUTS - Nomenclature of territorial units for statistics). Figures 3 and 4 provide an overview of the study area. These figures (left sides) show real spatial distributions for population by tertiary educational attainment level (male and female) across the EU regions.

It is clear that the levels of tertiary education attainment among men and women are not evenly distributed, but the level of education probably tends to be spatially correlated. Figures 3 and 4 illustrate the difference between the true – likely spatially autocorrelated distribution (left) and the simulated random distribution (right) for the population by levels of tertiary education attainment. The well-known Moran's I[1] test can be considered a quick check for spatial autocorrelation. If the observations are randomly distributed in space, there should be no particular relationship between the indicator population by level of tertiary education attainment and its spatial lag. This is the case of a simulated random distribution (see Figures 3 and 4 - right sides). The corresponding values of the Moran I statistic are shown in Table 1. Conversely, the observations have a particular spatial structure if the corresponding values of the Moran I statistic are statistically significant. It is therefore clear that the geographical location of the region and the characteristics of the neighborhood play a significant role in the analysis of educational inequalities within the EU.
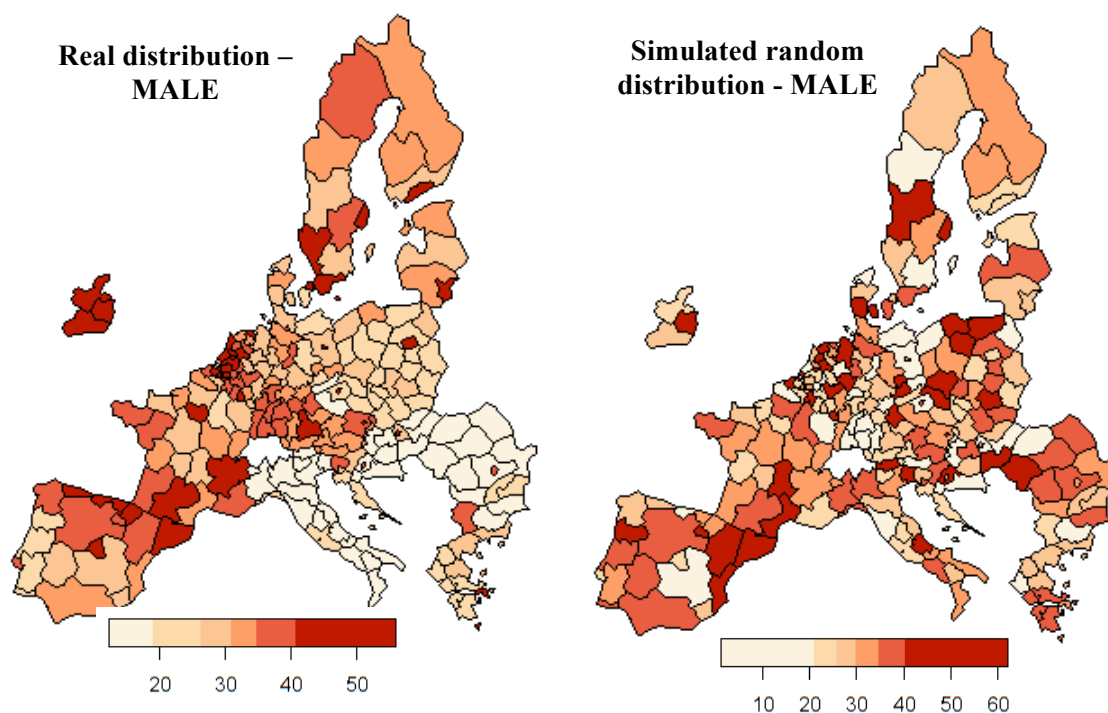
Figure 3: Illustration of the gap between real - spatially autocorrelated distribution (left) and simulated random distribution (right) for population
by tertiary educational attainment level (in %) - Male
Source: author's elaboration in RStudio

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[1] For calculation of Moran´I statistics, spatial weighting matrix of queen contiguity scheme was used. This form of matrix is used in all parts of our spatial analysis (for more details see, e.g., Anselin & Rey 2014).
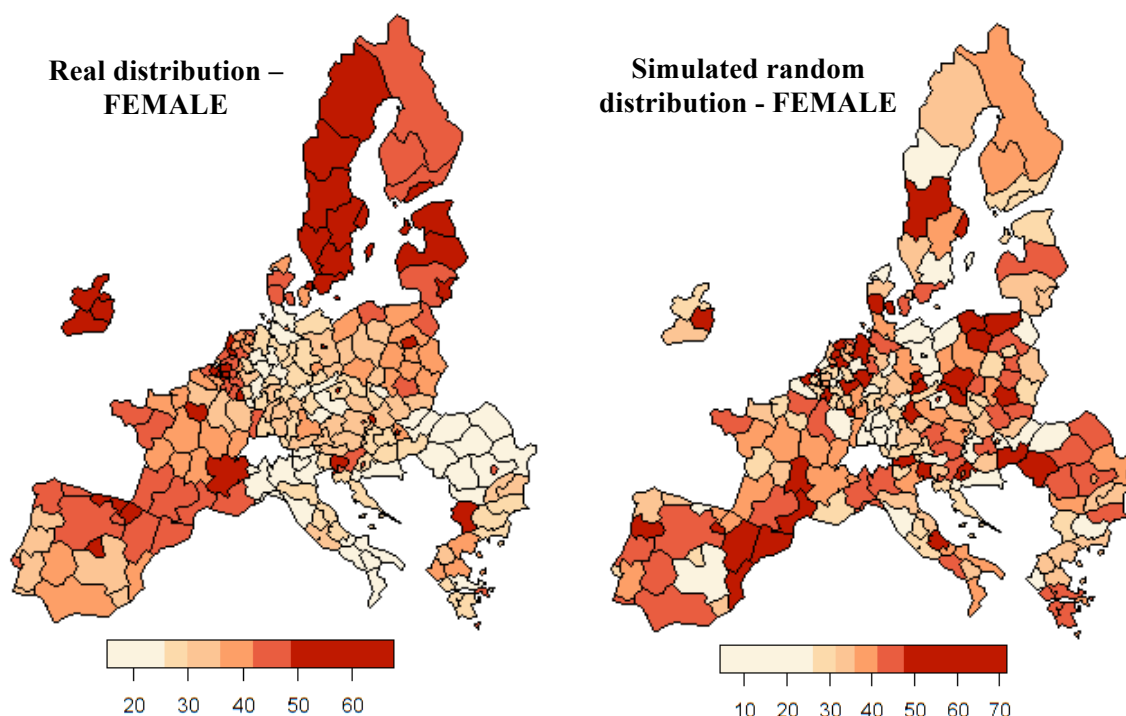
Figure 4: Illustration of the gap between real - spatially autocorrelated distribution (left) and simulated random distribution (right) for population by tertiary educational attainment level (in %) - Female

Source: author's elaboration in RStudio

	Population by tertiary educational attainment level (in %) - MALE		Population by tertiary educational attainment level (in %) - FEMALE		Population by tertiary educational attainment level (in %) - TOTAL	
	Real distribution	Simulated random distribution	Real distribution	Simulated random distribution	Real distribution	Simulated random distribution
Moran´s Index	0.4843***	-0.0003	0.4280***	-0.0003	0.4965***	-0.0374
Pseudo *p*-value	0.0010	0.4650	0.0010	0.4540	0.0010	0.2510

Table 1: Moran's *I* index of population by tertiary educational attainment level (in %) – Male, Female and Total

Note: Symbol *** indicates statistical significance at 1% level of significance

Geary cluster maps (constructed based on the local Geary statistic defined by formula [2]) provide more evidence about indicated unequal distribution and spatial clustering of tertiary education levels within the EU. Based on the Figure 5 we identify significant locations – regions with positive spatial autocorrelation. A significant local Geary statistic that is less than its expected value under the null hypothesis of spatial randomness suggests a clustering of similar values (small differences imply similarity). For those observations, the association high-high or low-low can be detected. Based on the indicator population by tertiary educational attainment level - Male, 36 high-high and 53 low-low local Geary clusters were identified (see Figure 5[a]). Similar spatial pattern can be seen from Figure 5 (b) where the results for the indicator population by tertiary educational attainment level – Female are depicted (42 high-high and 61 low-low local Geary clusters). The high-high locations (so-called hot spots) are mainly regions of Finland, Sweden, France, Ireland and Spain. These

regions are regions where high values of tertiary education levels are clustered. Low-low values (so-called cold spots locations) are mainly concentrated in regions of Italy and most of the Eastern European regions.

As the calculation of local Geary statistic is based on the squared difference (see formula [2]), there may be observations for which a classification to high-high or low-low clusters is not possible. This is because the squared difference can cross the mean (expected value). These locations are referred as other positive spatial autocorrelation (see Figure 5). As for negative spatial autocorrelation (large values imply dissimilarity), it is not possible to assess whether the association is between high-low or low-high outliers, since the squaring of the differences removes the sign (Anselin, 2019b). In this analysis, there is one region with this type of association for Male and Female.

(a)   (b)
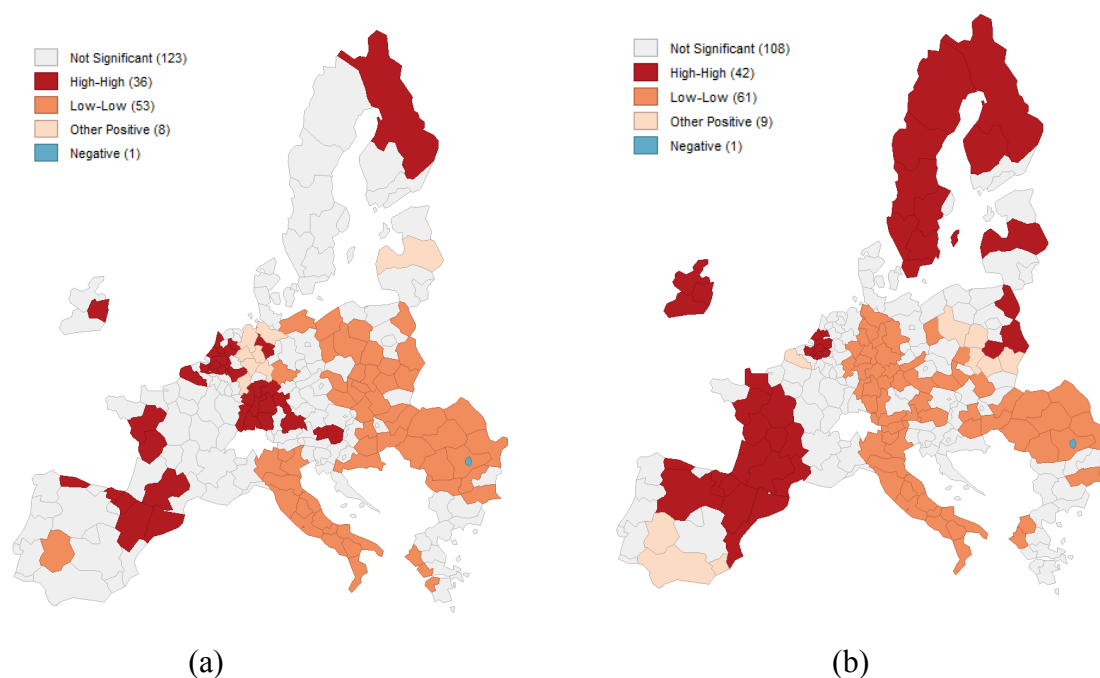
Figure 5: Local Geary clusters: population by tertiary educational attainment level (in %): Male (a) and Female (b)
Source: author's elaboration in GeoDa

In contrast to the local Geary statistic presented so far, the local Moran *I* statistic allows to assess whether the association is high-low or low-high in the case of negative spatial autocorrelation. We can see these associations on the Figure 6 (Lisa cluster maps) and they are calculated based on the formula given in (1) . Hot spot as well as cold spot localities detected on the basis of Moran's *I* statistics are in significant agreement with the results from Geary's statistics. The results thus indicate that inequalities in tertiary education within the EU regions are influenced by the spatial distribution of the regions, both with regard to the education of men and women.
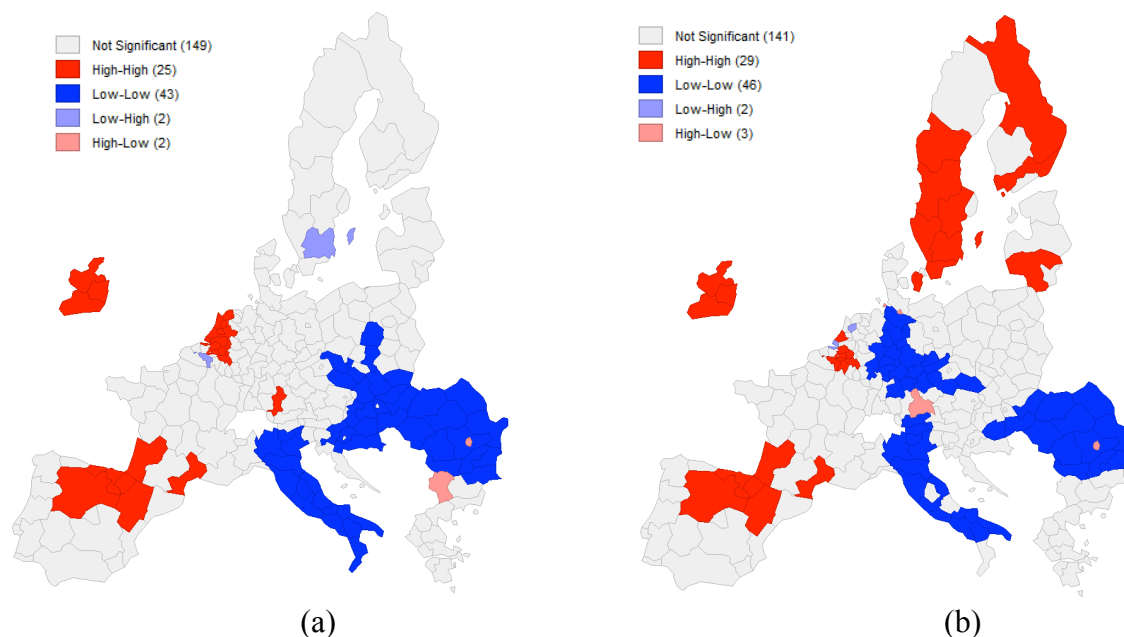
Figure 6: Lisa cluster maps: population by tertiary educational attainment level (in %):
Male (a) and Female (b)
Source: author's elaboration in GeoDa

Conclusion

The aim of this study was to examine the spatial distribution of educational inequality within the EU using a spatial statistics approach. The research uses spatial statistical techniques such as Geary and Moran statistics belonging to Exploratory spatial data analysis. The analysis was carried out in the context of the EU regions and focused on tertiary education for men and women. The findings reveal significant spatial differences in higher education inequality in the EU member states. By analyzing the spatial dimension of this issue, the study contributes to a comprehensive understanding of the geographic patterns of higher education inequality in the EU, and the results can be used in the creation of regional policies.

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Navigating Stormy Seas:
Techniques for Teaching Contentious Topics in Political Science Programmes

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Abstract
In increasingly polarized political contexts, exacerbated by concerns over student safety, mental health, and media hysteria over "safe spaces" and "cancel culture", teaching contentious political science topics has become more challenging than ever before. At the same time, students do not enter as blank slates on these topics and are likely to bring their own ideas – sometimes vociferously – into the classroom. Political science topics can be inherently binary, they can carry a high risk of pre-existing biases among participants, and they can be tense and uncomfortable to discuss. Under such circumstances, how can course tutors ensure that all perspectives on a given topic are adequately addressed while ensuring that discussions are held in a respectful and collegiate manner? In this paper, we offer reflective accounts of our own experiences of political science teaching in two particularly contentious areas in the UK higher education context – nuclear weapons and Brexit – where all of these risks are high. The paper offers three techniques for overcoming tension and ensuring that the topics are covered in a balanced manner to foster good faith discussion and debate. We emphasize the use of counter-balancing case studies which challenge existing biases, the "weaponization" of expected pre-existing biases to provoke critique, and the use of humor to create a positive, open and free learning environment. We conclude that the use of these techniques can be helpful in teaching contentious topics – helping practitioners to navigate the "stormy seas" of today's challenging political science teaching context.

Keywords: Polarization, Political Science, Higher Education

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1. Introduction

Political polarization has increasingly pervaded societies around the world. For those teaching in political science classrooms, this presents unique challenges – ensuring that debate remains balanced and respectful, ensuring that all perspectives are adequately covered, and ensuring that existing biases do not preclude students from exploring a given topic in its entirety. In this paper, we reflect on our experience teaching Nuclear Weapons and Global Politics in one case, and British Politics in the other. These topics at first appear to have little in common. Nonetheless, both faced the same polarization issue. It goes without saying that political science classrooms, where student interest in current affairs is high and some students may have even selected specific modules out of interest in activism around that topic, that these issues would be politically fraught. For the authors, the challenge of such polarization was to prevent classrooms from becoming "one-sided". As the so-called "Culture Wars" have become more problematic for classroom teaching, we sought means by which to ensure that these problems were mitigated against in our respective classrooms.

2. Literature Review and Methodology

The literature is abundant when it comes to advice for would-be educators and current educators struggling with the issue. Bielby (2003, pp. 377–379) provides three critical advice on how to teach contentious topics; to be well-prepared, to have appropriate facilitation, and to provide support. Hess (2004, pp. 259–260) identifies four ways of dealing with contentious topics in a classroom; to deny, to privilege, to avoid, and to provide balance in opinion. This paper builds on these works by presenting practical advice for other educators in teaching contentious topics in politics modules. There are some clear limitations to this research in that the evaluation of student responses are subjective and thus the authors cannot be certain that all students were able to learn in the way the classes were designed. The relatively small sample size also means that there is limitation in terms of generalizability of findings. Nevertheless, the aim of this paper is to share the practices of the authors in the hope that this will present a useful tool for other educators in their own journey in teaching politics in higher education.

A total of 236 students enrolled in British Politics in the academic year 2022/23, and 140 students enrolled in Nuclear Weapons and Global Politics in the same period. Of these numbers, we were each responsible for 40 students in the most recent semester at the time of writing this paper, in addition to 60 more from the previous year for Nuclear Weapons and Global Politics. Thus, the total number of students between us was 140.

The paper is structured based on the key lessons drawn out of the authors' teaching practice in these two modules. These are counter-balancing case studies, the use of pre-existing biases, and use of humor. Following Bielby's (2003) advice on how we need to be prepared, consider how to facilitate the delivery of the class content, and what support to offer, each section will discuss how the authors prepared for, facilitated, and provided support for the students. In addition, each section will specify which of the approaches to a contentious topic they adopted following Hess' (2004) four options (denial, privilege, avoidance, and balance). As stated previously, the primary aim of this paper is to share the authors' approaches to teaching contentious political topics so that it can provide a practical toolset for other educators to tackle the problem.

3. Counter-Balancing Case Studies

We define the use of counter-balancing case studies as case studies which run counter to expectations in the existing public and academic discourses. These were intended to challenge existing biases and open up debate by pushing back against stereotypes and previously acquired knowledge. The examples we focus on in this section are the examples of global leaders, particularly Prime Ministers Theresa May and Margaret Thatcher in relation to Nuclear Weapons and Global Politics, and the role of the £350m per week claim during the UK's referendum on membership of the European Union in relation to British Politics. In the prior case, this was intended to show the limitations in the feminist discourse in relation to nuclear weapons; in the latter case, it was intended to overcome the conception that people had been duped by a false claim in order to underscore why the claim was effective. In both cases, it was expected that pre-existing biases would play a strong role in shaping student responses, and so it was important to be aware of the political context in which the classroom was operating to ensure that planning could be made around such biases. This is the first component of the humorous contrarianism toolkit; we were "contrarian" to the popular academic and public discourses on these topics.

3.1 Counterbalancing in Nuclear Politics and Gender: Theresa May and Margaret Thatcher

In Nuclear Weapons and Global Politics, the specific class for the week was titled Gender and Nuclear Violence. Students had been expected to read Sex and Death in the Rational World of Defense Intellectuals by Carol Cohn (Cohn, 1987), a critically important text in the study of gender and nuclear weapons. The paper argues that the technostrategic language choices of experts in the fields of security and defense, particularly pertaining to nuclear weapons, are inherently heterosexual male-dominant and sexualised, and she argues that antinuclear and feminist activists should seek to challenge the claims to objectivity and rationality inherent in the security and defense fields. With this, however, came the danger that students would take views on deterrence as a simple male/female binary. In the wider context, there is a cultural tendency to conflate femininity with anti-nuclear views and with pro-disarmament stances, perhaps because feminist groups were at the forefront of anti-nuclear movements (Gwartney-Gibbs & Lach, 1991, pp. 161–162). Considering the significant danger of essentialising "women" as a single category lacking in diversity and only reinforcing what can be considered hegemonic views of femininity and masculinity (Brown & Considine, 2022, pp. 1261–1265), it was thought important to provide counterbalancing case studies to contextualise the theoretical discussions. The counter-balancing case studies were presented as a warm-up activity. This is showcased in Figure 1.

Warm-up Activity: Who said the following?

1: "We will retaliate if attacked first with a pre-emptive strike... We will leave _____'s military little short of total destruction and ruin".

2: "The whole point of a deterrent is that our enemies need to know that we would be prepared to use it."

3: "I call upon the scientific community... to give us the means of rendering these nuclear weapons impotent and obsolete".

4: "The weapons of war must be abolished before they abolish us".

Figure 1: A warmup matching activity used in Nuclear Weapons and Global Politics. The quotes were meant to run counter to the expectations and pre-existing biases which students were expected to have.

While students were asked to quote-match all of the figures, the major focus was on May. This was followed by an ad-hoc showing of the video clip in which May, in response to a parliamentary question, states in no uncertain terms that she would be willing to authorize a nuclear strike and that such a willingness was key to the UK's deterrent capability (BBC News, 2016b). This had a further beneficial reinforcement effect in that it honed in on the concept of deterrence – a core theme of the module – and showcased how it was deployed in real terms by world leaders. Under Hess' (2004, pp.259–260) four options, this most closely fit with "denial"; since the presentation was such that any of the four could have said any of the quotes, it fundamentally presented the issue as a noncontroversial one.

This produced the desired effect; by using "contrarianism", students questioned the discursive male/female binary in the following seminar activities, one of which was an activity where students applied a gender-based analysis to a quote (selected by themselves) from Prime Minister Thatcher, a figure with a considerably more divisive reputation in the UK political context, with young people (adults aged 18-24) holding more negative views than other age groups (YouGov, 2019). While it was thought important to begin with May as a "blank slate" to prove that the ostensible binary at play is in fact considerably more nuanced, the prior use allowed for the full exploration of the motivations of Prime Minister Thatcher's views on deterrence and nuclear weapons. This was backed by a small amount of background information and a further video clip of PM Thatcher's address to the Conservative Party Conference in 1989 ('Margaret Thatcher on Strong Defence', 2013). Students were able to apply a broad variety of motivating factors bringing considerable nuance to the discussion, and achieved the objective of giving students a deeper, more comprehensive level of understanding of the role of gender in nuclear politics; the risk of having a binary discussion based around male/female stereotypes was avoided through the use of these two counterbalancing case studies.

3.2 Counterbalancing in British Politics: The NHS and the £350m Per Week Claim

In British Politics, Brexit was proven to be a highly contentious topic. In Week 7 of British Politics, which covered the development of British politics from 1979 to the present, the 2016 EU referendum in which the majority of the public voted in support of Brexit was the main topic. The author adopted the option of privileging (Hess, 2004) the side of the Leave argument. This is why the Leave side's claim that £350m per week being sent to the EU would be put to better use if it was used to fund the National Health Service (NHS) in the UK was chosen as a key topic for the class. This claim acted as a counter-balance of the narrative that students would have been accustomed to, that the Leave side had won the referendum through the use of lies (Belam, 2016). This topic was relatively well-known among the British public and thus helped students formulate their own opinion on the topic as well as shortening the time of explaining it to students. Since the majority of young people supported Remain (BBC News, 2016a), it is not a stretch to believe that most of the students also would have also been inclined towards Remain arguments. In such a context, it was essential to familiarize students with the arguments from the opposite side as a counterbalance.

In terms of how the class was facilitated (Bielby, 2003), the seminar began with a brief explanation of the rebate system using official data from the Office for National Statistics (Keep, 2021). According to Bloom's taxonomy, this consists of knowledge and comprehension, ensuring that the students understand the mechanism behind the claim (Bloom, 1956). This was followed by a quote from Full Fact, an independent fact checking organization which verifies claims being made by "politicians, public institutions and journalists, as well as viral content online" (Full Fact, 2023). The quote from the Full Fact website can be seen in Figure 2.

Figure 2: A screenshot from the Full Fact website showing the claim from theLeave campaign and the response from the fact checking team (Full Fact, 2017).

By introducing the quote first, students were given the opportunity to think how they would interpret this information. This provided one level above what was presented previously according to Bloom's taxonomy (Bloom, 1956); it showed how the knowledge students gained on the rebate was being applied. By introducing the data as well as the rebuttal from Full Fact allowed students time to consider how the data was being communicated to the general public, including potential Leave voters. The purpose of the author's lecture, as well

as the essay question for the module, was to have students argue as to why the Leave side won.

In terms of support (Bielby, 2003), the author shared the PowerPoint slides with links to the primary sources so that students were able to check the sources themselves, which also helped some to use the example in their own essays. Thus, the use of this counterfactual, counterbalancing case study allowed for a higher-level of learning under Bloom's taxonomy (Bloom, 1956), and provided key training on conducting research on contentious topics.

4. Weaponizing Pre-existing Biases

With awareness of the teaching context core to the use of counter-balancing case studies, we also made use of the pre-existing biases themselves to create provocative discussion questions. This might be dubbed the "picking a fight" technique, and this was very much influenced by Hess' (2004, pp.259–260) second option of taking a side in a partisan manner. In Nuclear Weapons and Global Politics, the examples shown here are from a seminar titled Nuclear Weapons and Multipolarity, with two activities using this technique focused around the critique of pervading anti-US and anti-NPT arguments in the academic discourse with young people in Europe tending to be largely critical of US foreign policy and viewing it with cynicism (Greenwood, 2023). In British Politics, the polarization between leave and remain voters inherently led to a large risk of pre-existing biases. With large majorities of young people having supported remain (Eichengreen et al., 2021, p. 1131) and with a pervading discourse in some quarters that leave voters were "stupid" (Grant, 2017), this bias was addressed through an activity where students critically evaluated the arguments of both sides in a debate held by the BBC.

Students do not come to class as clean slates. Their previous experiences, their backgrounds, and their half-developed thoughts are brought into the classroom with them. There is pedagogical value in acknowledging this fact and using it effectively for pedagogical purposes. As Philip (2003, p. 371) notes, "a desirable pedagogic approach should recognise the importance of previous knowledge and beliefs in the learning context and express, wherever possible, non-judgmental respect towards these pre-existing values". Seminars are ideal places to try and test out these ideas and thoughts, helping hone their arguments. Similar to the contentious topics covered in the previous section, this could create problems as these unstructured thoughts and ideas could fossilise as pre-existing biases which limit the perspectives of students. In being contrarian to some of these ideas, we attempted to use partisanship as a means to deepen learning.

4.1 Nuclear Weapons and Global Politics: Anti-US and Pro-disarmament Norms

In Nuclear Weapons and Global Politics, the expected anti-US sentiment was first utilised in a warm-up activity with a counterfactual question: "If only one of the current nuclear-armed powers could have nuclear weapons, which would you want it to be and why?" Students were given a short period of time to discuss the question among themselves and then asked to volunteer answers – there are nine nuclear weapons states (Davenport & Kimball, 2023) (or ten if one counts Iran, which does not possess nuclear weapons but is generally considered a key nuclear threat), and therefore nine potential answers. The idea was to directly confront the students with the limitations of their own pre-existing bias; while they may not have been in favour of western countries possessing nuclear weapons, they were even less in favour of other countries possessing nuclear weapons. In the activity, most students answered Britain,

France or the United States with China coming a distant fourth. Student discussions centred around the issue of trust, linking to key debates in the wider module. The warm-up successfully achieved the goal of challenging discursive anti-American sentiment, which was a key objective in leading to the following activity.

The main seminar discussion was focused around the statement "It is fundamentally unfair that the United States should stop other countries developing nuclear weapons when it maintains an enormous nuclear arsenal". It was expected that most students would gravitate to being in favour of this statement, and indeed the initial reaction largely confirmed this. Nonetheless, students began to question it as the discussion continued; students incorporated the talking points of the previous discussion, and directly began to mirror some of the both real-world and theoretical discussions around arms control frameworks such as the Non-Proliferation Treaty (Tannenwald, 2013, p. 300). These talking points were successful in creating a nuanced, balanced discussion. Eventually the question was reformulated and students were asked to reflect on the issue in the aftermath; what was more desirable outcome for them, non-proliferation or fairness? This was done to encourage deeper thinking later, as leaving students in what was essentially a simulation of a real arms control debate with a lack of closure encourages reflection later even as it frustrates (Asal & Blake, 2006, p. 9).

Some students changed their minds on which was a preferable outcome when faced with the question directly after having it reframed via the activity; the weaponization of the pre-existing bias in pointing out the contradiction that fairness was necessarily the most desirable outcome in the study of nuclear weapons provoked visible shock and later rumination from some students when it was pointed out that they might actually be arguing for more, not less nuclear weapons in the world. This was also an effective utilisation of the students' inherent anti-nuclear weapons viewpoint; on the one hand, they believed strongly in the values of fairness and equality, on the other, they largely believed in non-proliferation. This seminar activity allowed both to be played off against one another and thus forced students to reflect on which value they thought preferable in the context of Nuclear Weapons and Global Politics. This deepened student learning; students were forced in very stark terms to come to grips with which "bias" was preferable, with the expectation that students would ultimately conclude that neither was ideal, but forcing them to confront the decisions which preceded major global agreements on nuclear weapons.

4.2 British Politics: Brexit Rematch

Once again, the example used here comes from Week 7 of British Politics. Similar to how the use of a familiar case study allowed for the class to focus on the discussion rather than introducing the case study itself, pre-existing biases can help the educator cover more topics in a short time. The module leader had also encouraged the use of students' instincts rather than their knowledge, cognisant of the diversity of the student cohort. Considering this level of diversity, the use of pre-existing biases was actively adopted as an ice-breaker activity at the start of the seminar. In the case of Brexit, students who were taking the course in 2022 would have been around 12 years old (assuming they were 18 years old at the time of enrolment in the course program) when the referendum was called and spent most of their GSCEs and A-level education following the news of the country's negotiation process for a Brexit deal. Brexit was thus a familiar topic for students. Thus, the background of students including their age and social network (Bielby, 2003) allowed for the effective use of pre-existing biases.

The class discussion was designed to first ask students to share how their family members, friends, and constituencies discussed Brexit. This enabled the discussion to naturally include both Leave and Remain perspectives. By encouraging students to share what kind of discussions they had with people who supported Leave and Remain, it personalized the different views and reduced the pre-existing biases to take control of the narrative.

This was followed by a group activity in which students became strategists for either the Leave or Remain campaign. The task was for them to think of three things as listed in Figure 3. First, they had to decide who they wanted as key spokespeople (high-profile politicians or public figures) who could best deliver the strongest arguments of their campaign. Second, they were asked to identify the key arguments which they believed would make their side appealing for both their base supporters as well as the people they believed could be swayed to support their side. Finally, they were asked to identify key voters - both those who were most likely to vote on their side, as well as the target group of potential voters they wanted to convince to vote on their side. This activity was only 15 minutes in duration, so it relied heavily on pre-existing biases as to what kind of arguments were most associated with either side as well as who they imagined supporting Leave or Remain. This encouraged students to consider both sides of the argument, which provided a balanced use of different opinions (Hess, 2004).

Brematch: Brexit rematch

Leave Campaign
- Key spokesperson(s)
- Key arguments*
- Key voters (those likely to vote & those you need to convince)

Remain Campaign
- Key spokesperson(s)
- Key arguments*
- Key voters (those likely to vote & those you need to convince)

Figure 3: The "Brematch" activity slide giving directions to students on how to conduct the task.

In short, rather than pre-empting pre-existing biases, the author decided to actively use it to humanize the different sides. Pre-existing biases can thus help students focus on the analysis, as well as help students consider different perspectives in a given argument.

5. The Use of Humor

Both authors made extensive use of in-class humor for the purposes of ice-breaking and to efficiently relay information. In Nuclear Weapons and Global Politics, a key approach to this across all classes was the use of internet memes, many of which were themed around the Star Wars franchise. Internet memes are increasingly used in modern classrooms across numerous disciplines; they promote critical thinking and creative activities based around them are a form of active learning (Kyrpa et al., 2022, p. 50; Wells, 2018, pp. 243–244), and they are

effective in catching and retaining student attention and relieving tension (Kyrpa et al., 2022, pp. 50–51). Star Wars was selected due to not only the author's personal interest in the franchise but also because of the broad space it occupies in popular culture; 63% of people in Britain aged 18-24 profess to have seen at least the original six Star Wars films (albeit with a slight imbalance between male and female demographics with 73% of males and 58% of females having watched them) (Nelson, 2012). Even those who had not seen the franchise can also be assumed to have at least some degree of knowledge of it considering it has been widely referenced or parodied in other media, and the humor-softening effect is still present regardless as long as students can tell that a joke is being told. The specific example is from the class Nuclear Weapons and Domestic Politics, in which the "For the Better, Right?" or "Anakin-Padme" meme template was used.

In British Politics, on the seminar about the 2010-2015 UK Coalition Government, a party-political broadcast which parodied the four highest-polling political parties (the Conservative Party, the Labour Party, the Liberal Democrat Party, and the UK Independence Party) was utilised. The task was for students to watch this 3 minute 40 second broadcast from the 2015 general election and discuss in pairs what it told us about the political parties in question. Since the video was a caricature of the four political most significant parties, the task was to identify the characteristics of them which were being made fun of. This is a key component of the humorous contrarianism strategy; in addition to serving its own purposes, humor signals to students that taboo and difficult topics need not be tense.

5.1 Nuclear Weapons, Global Politics, and a Galaxy Far, Far Away

The "For the Better, Right?" meme template focuses on the two characters Anakin Skywalker and Padme Amidala in a romance scene. The meme template refers to subverted expectations from an initially reasonable position with an undesirable outcome. This meme reached peak prominence in 2021 and remained popular for some time after (Google Trends, 2023; Know Your Meme, 2021). In the specific context of the class, the meme concluded a discussion on how views on security, deterrence, and nuclear weapons have shifted in Japan, which was given as a case study essentially arguing that changed circumstances have made issues such as nuclear weapons sharing more politically saleable in Japan than they were previously. The meme in question is presented in Figure 4, which was generated using a free online meme generator.
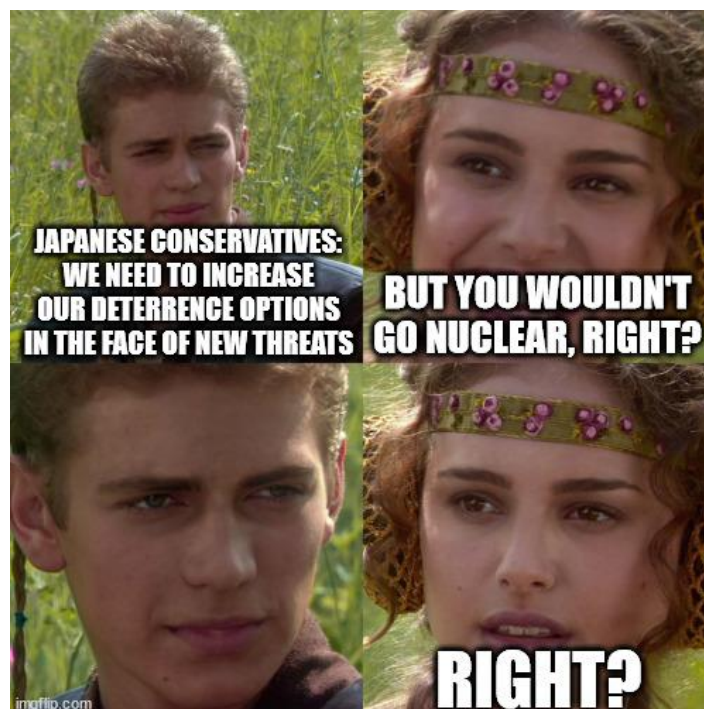
Figure 4: The "For the Better, Right" meme template as it appeared in a class activity. The meme communicates the idea that, contrary to pre-existing biases, deterrence is growing in prominence as a topic in the Japanese security discourse and nuclear weapons no longer hold the taboo they once did.

The meme was intended to convey a complex message in a simple format, encapsulating issues surrounding the security debate in Japan. The meme alludes to the possibility that while increasing deterrence options (a position which would widely be regarded as reasonable), that this could eventually lead to nuclear proliferation (an unexpected and less desirable outcome in the context of Japan and nuclear politics). This meme drew amusement from students, which was followed by further discussion and questions about the likelihood of Japan adopting nuclear weapons. This example, using Japan, also acted as a counter-balancing case study and it allowed the weaponization of students' pre-existing biases to subvert expectations. In the context of the class, this tied to a wider question about whether domestic politics were likely to cause or prevent nuclear proliferation. The humorous nature of the example created a positive atmosphere, and a robust discussion was held on the subject with a diversity of viewpoints. This worked as part of the broader strategy to combat in-classroom tension and to showcase that nuance was present even in seemingly clear-cut examples. Again, the goal was not to proselytize; only to encourage openness and diversity of viewpoints.

This strategy was successful, mirroring previous academic works (Garner, 2006, p. 180; Jeder, 2015, p. 829). Humor was used to soften the tension around difficult topics or topics where one-sidedness was expected. This was effective both because the references were immediately recognizable, and also because humor allowed for a higher degree of openness among students. Classroom climate is widely discussed in the existing literature; there is a wide consensus that perceived openness increases knowledge and engagement and even real-world political participation (Campbell, 2008; Castillo et al., 2015, pp. 31–32; Persson, 2015, p. 595). Humor was a useful means by which to improve classroom openness and to signal to students that even difficult topics could be discussed freely. In the teaching of topics where

strong preexisting biases were present or where classroom acrimony was expected, the experience of Nuclear Weapons and Global Politics demonstrated that it was vital.

5.2 British Politics: Parody and Political Satire in Education

The use of humor was attempted in most of the seminars, but there are many reasons why humor may be important in a politics class. For one, students tend to associate humor with enthusiasm towards the subject (Bakar, 2020, p. 143). Educators can use it to lighten tension, and if done sporadically it can help maintain a good balance between the seriousness of university education with an inclusive atmosphere (Bakar, 2020, p. 142; Martin, 2022). It helps distil complex topics into something people can understand (Becker & Bode, 2018), similar to the use of memes in the previous section.

A prime example of this was in Week 10 of British Politics in which the students were introduced to the UK's Conservative-Liberal Democrat coalition government (2010-2015). This time period presented a challenge as to how to best discuss the major topics of the time period in the span of a single seminar. The author decided to use a 4-minute party political broadcast from 2015 by the Green Party of England and Wales titled Change The Tune (♫ Change The Tune - Green Party Election Broadcast [2015], 2015). The broadcast was a parody of the four highest-polling political parties of the UK (the Conservative, Labour, Liberal Democrat, and UK Independence parties), and it encapsulated some of the main controversies of the coalition government (♫ Change The Tune - Green Party Election Broadcast [2015], 2015). The jokes were useful for a politics class as they were not only accurate, but captured the commonly held public discourse well - in other words, it "flew close to the truth" (Buonanno, 2018, p. 71).

The aim of this activity was a form of reverse learning with the students required to figure out the issues which were being parodied. In the 4-minute video clip, a parody of Deputy Prime Minister Nick Clegg, then-leader of the Liberal Democrats, winks suggestively as he sings along with the other politicians "and we all agree on tuition fees", as can be seen in Figure 5. The Liberal Democrats were at the height of their popularity in the lead up to the 2010 general election, leading some to describe the phenomenon as "Cleggmania". The key group energised by the Liberal Democrats was young people as the party promised an end to tuition fees. The Liberal Democrats formed a coalition government with the Conservative Party and raised tuition fees from £3,000 to £9,000, a move that was never quite forgiven by the public and contributed to their defeat in the general election five years later (BBC News, 2015). Thus, from just a second of footage, students needed to identify that the man was Nick Clegg, the promise that tuition fees would be eliminated, and that the Liberal Democrats reneged on this when they formed a government with the Conservative Party.

Figure 5: A screenshot from the Change the Tune broadcast showing the "wink" on the topic of tuition fees by the actor portraying Nick Clegg
(♫ Change The Tune - Green Party Election Broadcast [2015], 2015).

Consequently, the use of humour offers much potential and scope for creative teaching and can be used to serve as an important teaching tool. There are some limitations in this approach such as the need to avoid certain parodies (Hess, 2004) to maintain an inclusive environment. In short, humor, if used appropriately, has the potential of elevating the student learning experience.

6. Conclusions

Both authors found the strategy of humorous contrarianism effective in maintaining open classroom environments and promoting discussion of difficult or one-sided topics. In particular, our collective experience has reinforced the findings of previous academics on the efficacy of using humor (Garner, 2006, p. 180; Jeder, 2015, p. 829), and on the criticality of preparation and knowing the material (Bielby, 2003, p. 377). We would emphasise in addition to the criticality of the knowing the material that knowing the context on key political debates is key. We also made conscientious efforts where possible to ensure that the materials we used were accessible and well-known. In doing so, we were able to immediately and positively signal to students that these topics were "open for discussion" and could be enjoyed despite the sometimes difficult and uncomfortable nature of the discussions. The counterbalancing case studies and weaponization of pre-existing biases worked in conjunction to enable this. We hope that these techniques will provide grounds for further experimentation in teaching difficult topics in an increasingly polarized university environment.

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Using Technology to Teach English Communication for Repeaters

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Abstract

Eight students (n=8) attending a required course called English Communication at one university in Japan were taught during fall AY2020 (i.e., from September 2020) after the instructor reviewed literature from January 2017 to August 2020 on teaching EFL learners who are repeating their courses. When class began in September, the instructor started teaching 15 sessions on zoom with each session consisting of two 90-minute sessions on zoom, and took notes after class based on class observation after each session. Based on a synthesis of literature review and notes based on observation, it became evident that (1) a semester-long twice a week 90-minute course based on having students make answers based on open-ended questions can elicit increasingly complex responses from students whose TOEIC scores range from 295 to 345 points in the target language; and (2) having students submit reflections at the end of each class can enable teachers to understand difficulties students are facing with developing their linguistic skills and encourage students to reflect on themselves for personal development. Details of literature review, open-ended questions, and notes based on observation will be presented to help the audience think about ideas that can be applied to their own classes.

Keywords: English Communication, Japanese University Students, Retaking Required Courses

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Introduction

A review of literature between 2017 and 2020 suggests eight key points EFL instructors should keep in mind to support remedial EFL students at the university level. First, instructors should keep in mind how their actions can affect students' levels of motivation (Han, Takkaç-Tulgar, & Aybirdi, 2019; Jodaei, Zareian, Amirian, & Seyyed, 2018; Khouya, 2018; Quadir, 2017). Second, instructors should aim for low-stakes, high-interest instruction (Quint Oga-Baldwin & Fryer, 2018). Third, instructors should allow students to use visuals when presenting (Iida, 2020). Fourth, instructors should allow students to become used to performing assigned tasks and teachers should be persistent to get students to complete tasks instead of adjusting them immediately (Yamaoka, 2019). Fifth, instructors should consider students' interests and classroom dynamics for tasks (Ghonsooly, Hassanzadeh, Samavarchi, & Seyyedeh, 2017; Yamaoka, 2019). Sixth, instructors should consider various ways to provide feedback and consider cognitive-load on students when providing feedback (Ghosn-Chelala and Al-Chibani, 2018). Seventh, instructors should provide updated content and materials (Custorne & Beh, 2018; Ghonsooly, Hassanzadeh, Samavarchi, & Seyyedeh, 2017). Eighth and finally, instructors should provide successful experiences for students (Ghonsooly, Hassanzadeh, Samavarchi, & Seyyedeh, 2017; Quadir, 2017).

The author reviewed the aforementioned literature, written between 2017 and 2020, from August 2020 to September 2020, to prepare to teach a course on English Communication for eight university students in Japan. Although the author has been teaching the course since 2018, preparation for the fall of academic year 2020 was felt to be particularly important. Specifically, while instruction during 2018 and 2019 were in the classroom, instruction during 2020 was completely online due to COVID-19. The course was designed for students whose TOEIC Bridge scores were between 115 and 130 points, equivalent to between 295 and 345 points on the TOEIC test (ETS, 2006). The ensuing sections will cover: (1) course design, (2) reflections on teaching that consider both the literature review and the instructor's weekly field notes, and (3) implications for instructors teaching EFL.

Course Design

After a review of literature, the course syllabus was reexamined. This was done for the instructor to teach his students as effectively as possible throughout the course. The course consisted of 15 sessions from September 23rd, 2020 to January 13th, 2021. Each session consisted of two parts: a 90-minute session from 1pm to 2:30pm (i.e., third period), and another 90-minute session from 2:40pm to 4:10pm (i.e., fourth period). There were three components to grades: (1) Class Activities, (2) Midterm Quizzes, and (3) Final Quizzes. Each activity consists of one or two open-ended questions. For each question, students were required to write at least seven sentences for their answers. Forty minutes were allocated to introduce two open-ended questions and for students to work on the questions while on zoom (zoom Video Communications, Inc., 2023). The instructor stays on zoom to support students when they have questions. The purpose of setting aside 40 minutes and providing feedback as necessary within that timeframe was so that the instructor can consider students' cognitive load, or more specifically, the intensity of tasks they can manage within a given time-frame (Ghosn-Chelala and Al-Chibani, 2018). The students are required to submit their work in approximately 40 minutes for the tasks they worked on before the midterm. This was followed by a five-minute break, in which the instructor compiled work submitted online by the students into one Microsoft Word document. After work from students were collected, the instructor allocated 45 minutes to provide feedback to the entire class commenting on points

the students did well on and points they could improve on. Students took a ten-minute break before the next period (i.e., fourth period).

During the fourth period, the instructor had students enter another zoom session through another zoom invitation for internet security, and had students prepare for oral presentations during the second-half of fourth period. During the first half, students were asked to: (1) practice for fluency, intonation, pronunciation, pauses between sentences, and emphasis of words, and (2) were encouraged to present without looking at the scripts that they wrote, so the tasks do not become perfunctory. In the second half of the period, eight students who registered for the course were asked to present in the order they were assigned, and were given a maximum of three minutes to present. Feedback on good points and points to improve on were provided. For their assignments, they were asked to submit a reflection by 10 pm on the day the class was conducted in Japanese, their first language, in at least seven sentences, focusing on two points: (1) the contents of their classmates' presentations, and (2) what they learned from feedback from their instructor after their presentations. They were also asked to include the edited version of their scripts based on feedback from third period.

After the first six sessions, session 7 and session 8 were midterm quizzes to assess students' ability to communicate in English. For session 7, the students were required to present on: (1) one question they prepared and presented on before, and (2) one answer to an original question they made themselves. For session 8, the students were required to present on: (3) another question they have prepared and presented on before that they did not present on during session 7, and (4) one answer to another original question. The students were asked to think of an original question themselves after they became familiar with a variety of open-ended questions. This was done so that students could reflect on questions that they felt were personally relevant in the target language after they have become familiar with different types of open-ended questions in the target language (Quint Oga-Baldwin & Fryer, 2018).

After the first eight sessions, there were four more sessions, followed by two final quizzes. From sessions nine to twelve, they continued to work on open-ended questions like before the midterm quizzes but this time by using reading materials to support their answers. Following the midterm quizzes, from reading the students' weekly reflections, the instructor felt that students were ready to be introduced to the concept and the practice of not only providing answers to open-ended questions but also providing answers with evidence. For final quiz part 1, for review, students were required to: (1) present on one question that they have presented on before the midterm, and (2) make and answer one original open-ended question. After that, for the final session for this course, the students were required to: (1) present on one question that they have presented on after the midterm, and (2) make and answer one original open-ended question using at least one source to support their answer.

Reflections on Teaching: Adjustments Throughout the Course

The first session was held on September 23rd, 2020, and out of eight registered students, six attended the class. The lesson unfolded as designed. However, out of six students, only one student was able to write full answers (i.e., at least seven sentences) to the two open ended questions. With previous literature suggesting that teachers should be persistent with the tasks and allow time for students to get used to tasks (Yamaoka, 2019), while providing successful experiences for students (Ghonsooly, Hassanzadeh, Samavarchi, & Seyyedeh, 2017; Quadir, 2017), the teacher provided full credit for all students attempting to complete tasks by turning in what they could write within the allotted time. One student mentioned that she was not

used to computers and typing. However, the student also mentioned that she will try to stay with the class, and it was good to know the flow of the entire course during the first session. She has mentioned that she will stay with the other students as much as she can.

During session 2, seven out of eight students attended. Most students found it difficult to submit responses to two open ended questions. However, most were able to finish writing detailed responses to one question. A student requested that the instructor provide questions before the beginning of each class, so students who wish to work on the questions beforehand could work on them before the session starts. Since literature on EFL has suggested that instructors keep in mind how their actions can affect students' levels of motivation (Han, Takkaç-Tulgar, & Aybirdi, 2019; Jodaei, Zareian, Amirian, & Seyyed, 2018; Khouya, 2018; Quadir, 2017), the instructor accommodated for that student's request by allowing students who wish to get a head start on the open-ended questions 15 minutes prior to the start of each session after session 2.

During session 3, six out of eight students attended. The student who requested the instructor to have students start to work on their two questions 15 minutes before the start of class seemed to have started early and was able to submit 10 to 15 minutes before the deadline. That student requested that he stay with the instructor voluntarily after class and discussed what he is currently working on related to his English studies and how that is connected to his future vision. Upon reflection, accommodating the student's wants may have successfully contributed to building rapport with the student. The instructor ended the class with a certain level of concern for those who were absent during the session, in terms of developing a routine for working on their English.

During session 4, several students entered their zoom sessions late but six out of eight students attended. The questions were more complex this time than previous ones. Only a few students could answer both questions within time allotted. During the presentation portion of the work, several key words and phrases that they can pronounce or enunciate better were pointed out. Students seemed to not be able to pronounce words that they were not familiar with. For example, many could not pronounce the word *specifically*. They also had trouble enunciating words particularly words that are plural (e.g., countries). After the feedback phase, it was difficult for many students to read smoothly from the scripts that were edited. They had difficulties pausing at appropriate places for information that they presented for their presentations to be processed and clearly understood by the instructor. Words of encouragement were provided to start practicing for the midterm, in which one component of it was to ask students to present their answers to one open-ended question that they have presented on before. Their jobs were to prepare to present so they could present smoothly without looking at their scripts during their midterms. A reminder was given ahead of time so that students can have successful experiences during the midterm (Ghonsooly, Hassanzadeh, Samavarchi, & Seyyedeh, 2017; Quadir, 2017).

During Session 5, seven out of eight students who were registered attended class. It was the first time for one of the students to attend. The class went smoothly. One student asked to leave early because he had things to do. In his open-ended response to one of the open-ended questions on how he would change once he graduates from university, he said he will be busier, and he wanted to get many things done while at university. Another student expressed how lonely he felt as a result of not being able to meet faculty members and other students face to face. Upon reflection, providing opportunities for reflection after class as part of their course assignment after every session was effective in providing the instructor an

understanding as to factors outside of the classroom that could affect the quality of students' levels of class participation (Quint Oga-Baldwin & Fryer, 2018).

For session 6, class went smoothly. Students seemed to have gotten into the habit of writing class reflections, and many students have started to derive intrinsic motivation from answering the questions. This is aligned with Yamaoka's (2019) suggestion that instructors should allow students to become used to performing assigned tasks and that instructors should be persistent to get students to complete tasks instead of adjusting them immediately. On the other hand, one student was absent two times in a row.

However, during Session 7 and 8, there was a midterm, and all students attended the class. Although each of the four midterm quizzes was only 5 percent of their grades and were low-stakes (Quint Oga-Baldwin & Fryer, 2018), the word *midterm* might have encouraged attendance particularly during a difficult time with COVID19 in which many students were taking classes online which was a mode that they were unfamiliar with instead of on campus. During third period, students presented on their answers to one of the twelve questions we had already covered. Students scored from 3 to 4.5 points out of 5 points on the quality of their presentations. During fourth period, students presented their answers to an original question they came up with themselves. What students talked about included: (1) lessons and experiences from the time they were university students, (2) future goals, (3) hobbies, and (4) dreams of going abroad. It seemed that students with students' dreams of going abroad, learning English was relevant, and what students needed was successful experiences to build their confidence and ability to utilize English abroad (Ghonsooly, Hassanzadeh, Samavarchi, & Seyyedeh, 2017; Quadir, 2017). Students scored from 3 to 5 points. Five areas that they can improve on were addressed: (1) eye contact, (2) avoid long pauses, (3) pronunciation, (4) intonation, and (5) avoid long pauses if possible. With session 8, there was another midterm, and all students showed up for the test. Students did not have problems with intonation. For the future goals of the course, it was recommended that students present without their scripts as much as possible while trying to avoid long pauses, practice pronunciation of difficult and unfamiliar words for accuracy, and avoid long pauses.

Session 9 was the first session after the midterm. The initial plan was to have students do the same routine of having them write out scripts during the first 40 minutes. However, that task turned out to be 60 minutes, because after the midterm, the instructor planned to have students read an article and provide open ended answers noting the similarities and the differences between the opinion of the author of the article and their own. One student has said after the first 30 minutes that he cannot finish writing in 40 minutes. So, time was extended to 60 minutes. Before the 60-minute time limit, students were asked to turn in their scripts and the instructor started providing feedback after 60 minutes was over. The feedback extended to fourth period, and after that, the instructor explained in detail about the contents of the reading for students to rework on their scripts as their assignment due by 10pm on the same day. Students were expected to rehearse for their presentations next time, and the instructor told the students that he would provide feedback on their speaking during the next class.

For session 10, one student did not show up, and because there were three students absent last time, the instructor had them present towards the end and provided feedback first on the assignments that those who attended class turned in. Seven students did their presentations during the last half of the third period and the instructor gave students feedback on parts that they can further improve on. During the fourth period, the instructor provided feedback on

scripts that those who were absent submitted before the start of fourth period. The instructor also went over speaking tips so that they could recite their presentations in front of the whole class for the second time during the second half of fourth period. This time, students were asked to write reflections that is at least seven sentences in length in English due by 10pm on the same day focusing on what they learned from their feedback and their classmates' presentations. Three students submitted their assignments on time, and one student e-mailed the assignment at midnight stating that the student forgot to press send. This felt inevitable due to COVID-19 and online courses. The fatigue from numerous assignments as well as the increase in the level of this new assignment in which students are asked to write in English as well as due to the number of absences last session, it was reasonable that four out of seven students who attended this session submitted their assignment.

Sessions 11, 12, and 13 were challenging for students, and striking the balance between persistence (Yamaoka, 2019) and success (Ghonsooly, Hassanzadeh, Samavarchi, & Seyyedeh, 2017; Quadir, 2017) was difficult for the instructor. For session 11, students read an article on diversity and prepared their scripts for two questions related to the topic. Two students wrote that they felt their lack of competence. Some reasons noted were a lack of knowledge about society in general from not being able to answer in detail to the two questions on diversity and the quality of their work compared to their classmates. It made sense for the instructor to address those two points during the next session. Specifically, some students enrolled in the course have taken several courses with the instructor and they have an advantage over those who have not taken any, so it is better for the students to mentally reframe and think that with effort, they can achieve the level of proficiency that their classmates have achieved. For session 12, the students presented on their articles and the instructor provided feedback, and for session 13, the instructor had students write about the similarities and differences of challenges college students abroad and college students in Japan are facing and possible solutions to alleviate the situation using one source.

While the task of providing answers to open-ended questions using a source was difficult, the students during the final assessment (Session 14 and Session 15) showed growth because of overcoming the challenge. During Session 14, students took final assessment quiz 1 parts 1 and 2, and one student was absent. Overall, students' presentations were clear. They projected and they could get their message across clearly. Students still could improve on their fluency by avoiding long pauses, speaking without looking at the script and making more eye contact, and refine their pronunciation and intonation. During the second half, feedback was provided, and students did not ask specific questions afterwards. For Session 15, students took final assessment quiz 2 parts 1 and 2, and all students showed up to class. Everyone who showed up to class passed, and there was an improvement of overall fluency and accuracy in students' output.

Conclusion: Implications for Instructors Teaching EFL

This paper examined eight university students who are repeating a required English Communication course at a university during COVID-19, when all class sessions normally conducted in the classroom turned into online instruction via zoom. Aligned with the literature on EFL in the tertiary setting, instructor's actions seemed to have influenced students' level of motivation to participate in class (Han, Takkaç-Tulgar, & Aybirdi, 2019; Jodaei, Zareian, Amirian, & Seyyed, 2018; Khouya, 2018; Quadir, 2017). In reality, however, because the course was conducted on zoom and some were attending class from smartphones and some from their personal computers, it was difficult to have students use visual aid as

suggested by literature when presenting (Iida, 2020). As literature suggests, it is important for instructors to anticipate technical difficulties (Alizadeh, Mehran, Koguchi, and Takemura, 2019). Having students write reflections after each class session can clarify students' technical issues as well as other responsibilities students are facing. Furthermore, having students write answers to open-ended questions can help the instructor understand students as individuals including their interests and that can be conducive to a positive classroom atmosphere in which the instructor not only can understand about the linguistic skills of the individual students but also become involved in facilitating their development of becoming responsible citizens. Each instructor at university can possibly formulate their own open-ended questions (Custorne & Beh, 2018; Ghonsooly, Hassanzadeh, Samavarchi, & Seyyedeh, 2017) and make the questions more challenging (Yamaoka, 2019) as their courses progress, to help his or her students for their linguistic, cultural, and social development while considering cognitive load, classroom dynamics (Ghonsooly, Hassanzadeh, Samavarchi, & Seyyedeh, 2017; Yamaoka, 2019), and the balance between students' success and the degree of challenge for each task that is provided in and outside of class.

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Contribution of Ergonomics in Designing Accessible Classrooms for Deaf and Hard of Hearing Students in Indonesia: A Proposed Guideline

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Abstract
For the past decade, several studies have been conducted in order to assess and confirm the impact of the physical classroom environment towards students' learning effectiveness, including deaf and hard of hearing (DHH) students. Several principles of ergonomics have been gathered aiming to provide guidelines in building a classroom that serves DHH students' needs. However, there is limited research on what needs to be considered when designing classrooms for DHH students in Indonesia. Looking at the fact that there are 2,270 special schools in Indonesia (Center for Data and Information Technology, Indonesian MoEC, 2020) with more than four classrooms used for DHH students in each school, a guideline which provides minimum requirement on designing classroom for DHH students is needed in order to ensure that the classroom would present positive impacts to the students' academic progress, not hindering the process of learning. This research aims to support academic progress of DHH high school students in Indonesia by providing inclusive classrooms using our proposed guideline synthesized from a systematic review of 12 academic papers. In the guideline, the first principle is to prioritize the comfort of the students, which is crucial for their psychological safety leading to engagement in class. The second principle is to enable them to function optimally as students. This proposed guideline places emphasis on resource availability, enabling teachers to implement it in accordance with the specific requirements of DHH students within the classroom setting.

Keywords: Ergonomic Design, Inclusive Design, Classroom Design, Hearing Disability

Introduction: Background and Objective

Indonesia, committed to providing quality education without discrimination, established this principle in the Law on the National Education System (No. 20 of 2003). The law places the responsibility on both national and local governments to create a conducive learning environment where students can actively develop their potential. It is further detailed in Government Regulation No. 32/2013, specifying aspects like school buildings and classrooms. Ministerial Regulation No. 22/2023 of the Ministry of Education, Culture, Research and Technology (MoECRT) provided specific definitions regarding these facilities.

Based on the Ministerial Regulation No. 14/2017 issued by the Ministry of Public Works and Public Housing, focusing on building access requirements, including accessibility features. Despite rooting in Universal Design, the Ministerial Regulation primarily addresses physically visible disabilities. This overlooks non-physically apparent disabilities like deafness. This regulation, while a positive step, only provides examples of accessibility features like ramps for wheelchair users and tactile paving for students with vision impairments (Norman et al., 2020). Currently, DHH students are usually put in special schools because the public schools are yet to implement an inclusive learning method and environment, despite their ability to follow the curriculum in regular public schools.

Deafness poses a unique challenge as it is not immediately visually discernible, which might lead to its oversight in architectural design. This oversight is crucial as deaf and hard of hearing (DHH) students heavily rely on visual cues for communication and navigation, inadvertently leading modern architectural designs to prioritize aesthetics, inadvertently isolating them (Oliviera et al., 2020). Addressing this gap, the DeafSpace Guidelines advocate inclusivity in architectural design by delineating key design concepts for a deaf-friendly environment. These encompass sensory reach, space and proximity, mobility, light and color, as well as acoustic and electromagnetic considerations.

In examining the current state of classrooms at the oldest special school in Southeast Asia, located in Bandung, West Java, Indonesia, it becomes evident that they fall short in providing adequate sensory range. As of 2020, the vice principal revealed that one classroom, with unspecified dimensions, accommodates three to four groups of students (Alhamidi, 2022). Each group consists of at least five primary schoolers or eight middle and high schoolers. However, it is important to note that the classroom is not specifically tailored for DHH students. According to the Center for Data and Information Technology, Indonesian MoEC (2020) there are 2,270 special schools in Indonesia with more than four classrooms used for DHH students in each school. These classrooms are not specifically designed for DHH students since other students are using the class simultaneously.

A study conducted in one of the oldest universities in Bandung assessed a lecture room using DeafSpace Guidelines. Beyond the structural aspects, the study emphasized the pivotal role of interior manipulation in enhancing comfort, consequently boosting learning effectiveness for DHH students (Harahap et al., 2020).

This paper aims to synthesize a comprehensive guideline for crafting inclusive public high school classrooms for DHH students in Indonesia. Derived from a systematic review of 12 academic papers, the review is designed to offer a detailed overview of recent findings concerning the interplay between ergonomic principles and classroom design for this demographic. It outlines minimum requirements, focusing on ergonomics to enhance learning

productivity by establishing a comfortable environment that mitigates physical fatigue, consequently fostering heightened student motivation. The focus on high school classrooms is predicated on the available body of literature pertaining to this age group, comprising students typically aged between 16 and 18 years old. This scope encompasses classrooms in public special schools, considering the distinctive processes that govern the provision of facilities in public educational institutions. Clusterization is based on the level of accessibility based on resources available as well.

Methods

The Process of Systematic Literature Review

The systematic literature review aims to address the following research questions, with the objective of formulating a proposed guideline for inclusive high school classrooms that facilitate the academic progress of DHH students in Indonesia:
1. What are the prominent factors proven to be effective in improving learning productivity for DHH students in classroom design?
2. What are the prominent factors for designing a DHH classroom that can be implemented in Indonesia?

The literature search was conducted from July to August 2023, utilizing the Scopus (Elsevier) database, which provides results across various fields of interest, including ergonomic design, deaf and hard of hearing, inclusive design, psychology, and education. The selection process involved the use of Scopus search and filter engine, employing specific keyword combinations as follows:
1. '*ergonomics in classroom design in Indonesia*' followed by a 'worldwide' search using the keywords combination '*ergonomics in classroom design*'
2. '*classroom for deaf student in Indonesia*', followed by a 'worldwide' search using the keywords combination '*classroom for deaf student*'

The search also implemented inclusion and exclusion criteria. Articles were included if they were published between 2013 and 2023, mentioned tangible characteristics of classroom design (such as size, layout, arrangement, furniture, etc.) for all age groups, and utilized all methods of data collection. Articles were excluded if they were published before 2013, mentioned disabilities other than deaf and hard of hearing, or if they highlighted aspects that need to be considered in the classroom but were intangible, such as pedagogical aspects, curriculum models, teaching methods, etc., without explicit reference to the physical attributes of the classroom environment.

The authors systematically integrated all discernible and measurable attributes derived from the selected literature. This approach was adopted to provide a clear explanation of the indicators prevalent in the design of classrooms tailored for deaf and hard of hearing students. The deliberate exclusion of intangible factors stemmed from a strategic intent to ensure that the ensuing guidelines would be both comprehensive and pragmatically applicable to teachers in Indonesia. By affording exclusive attention to tangible aspects, this study aspires to offer actionable guidelines for enhancing the learning efficacy of deaf and hard of hearing students within classroom settings.

Identification

Total records found through Scopus (Elsevier)
database, using two keywords combination:
'ergonomics in classroom design' and
'classroom for deaf students' ;
using 'Indonesia' as the first filter on the first
search, then
using 'worldwide / all countries' on the second
search
(n = 443)

Screening with eligibility assessment

Records did not match the include and
exclude criterias
(n = 427 not included)

Screened

Total records screened
(n = 16)

Screening from duplication

Records found due to citation duplication
was removed
(n = 4)

Included

Total records passed the eligibility assessment
and duplication
(n = 5 for **'ergonomics in classroom design'**
and
 n = 7 for **'classroom for deaf students'**)

Figure 1: Summary of the literature search process

In the initial phase, a total of 443 papers were identified. Subsequently, 427 articles were
excluded based on the pre-defined eligibility criteria, as previously outlined. Out of these, 16
papers were gathered, and an additional four were eliminated due to redundancy.
Consequently, this search process yielded 12 articles, encompassing elements pertinent to the
formulation of effective classroom design (n = 5 papers) and features conducive to the
learning experiences of deaf and hard of hearing students (n = 7 papers).

During the screening process, the authors collaborated to look at the connection between the
paper to the objectives by reading the abstract. For those papers that initially demonstrated
the capacity to address the research questions, a comprehensive analysis was conducted,
involving the systematic listing of methodologies and outcomes. Due to the limitation of
personnel, the screening process was conducted qualitatively with expert supervision. without
utilizing any inter-rater reliability assessment.

The systematic literature review conducted in Table 1 (Appendix) reveals several factors that
have the potential to serve as foundational principles when designing classrooms for students
with hearing impairments (DHH). However, the specific implementation of these factors is
contingent on the unique characteristics of the students who will be utilizing the classroom on
a daily basis. For example, the selection of classroom colors presents a notable consideration.
Barrett et al. (2015) suggest that employing balanced and saturated colors on the walls is

appropriate for providing an intermediate level of stimulation. Nonetheless, the applicability of this recommendation hinges on the age group of the students. While this color scheme may remain suitable for children, it could potentially overwhelm adolescents, potentially overloading their visual cognition. Consequently, high school students might derive greater benefit from lighter and pastel colors on the walls.

A similar situation arises with seating arrangements. Both Manca et al. (2020) and Taylor (2020) advocate for classroom designs that afford seating flexibility, enabling students to readily adjust their seating and allowing them room for movement if required. However, this level of adaptability may not be imperative for high school students, who typically exhibit a preference for a more static approach to learning. Instead, emphasis should be placed on determining the appropriate seating layout, such as a U-shape or semi-circle arrangement. Given the potential existence of other pertinent aspects necessitating consideration, albeit with varying interpretations of implementation, a synthesis process is imperative to formulate a more comprehensive proposed guideline that can be directly applied in the design of classrooms for DHH students.

The Process of Synthesizing the Proposed Guideline

The systematic literature review has identified various aspects that must be measured and assessed when designing classrooms for students with hearing impairments (DHH). However, these findings have not been synthesized into a practical guideline that can be directly utilized by classroom designers before construction or by teachers after the classroom is built. The process and results of this synthesis will be explained in this section.

The authors believed that a proposed guideline should be specific and comprehensive to facilitate easier implementation. Due to the lack of specificity found in the literature, the authors decided to create a guideline tailored for DHH students in Indonesian high schools, specifically for those aged 16-18 years. The intention was not to focus solely on maintaining students' attention spans (assuming high school students have already outgrown this issue) but to enhance the effectiveness of the learning process.

The proposed guideline comes from synthesizing recommended aspects cited in the literature, choosing the ones that are prominent to be mentioned and necessary to be put into practice. The authors used thematic content analysis which was performed under the supervision of an expert who continuously challenged and gave feedback on how the author clustered the relevant. findings. However, the authors try to put some aspects that could be not a priority, considering the unpredictable power outages due to improper distribution of power supply and the difficulty to have maintenance budget in schools in Indonesia to fully implement it.

The aspects mentioned in the proposed guidelines are divided into two big clusters: 1) hard to change by teachers, and 2) easier to adjust by teachers. This clustering was based on High School Building Development Guidelines published by Directorate General of Early Childhood Education, Elementary Education, Middle and High Education (2020) where it talks about the process of revamping the classroom and school building. It says that to renovate the building needs several steps that have to comply with the checklist of identification of the fulfillment of space functions, the budget would be rocketing, and the request to renovate would not directly be approved by the government as well. Therefore, assuming that there are lots of classrooms and schools in Indonesia that have not yet met the

indicators to promote comfort for DHH students, the authors propose to categorize the aspects in 'hard to change' and 'easier to adjust' clusters, for easier implementation.

Conclusion: Results and Discussion

In the preceding section, the authors attempted to categorize the guideline into two primary groups: 'hard to change by teachers' and 'easier to adjust by teachers'. The former refers to aspects that are already in place and would require significant classroom renovations for improvements, making changes time-consuming. Although these aspects are crucial, the authors do not want to restrict teachers from making necessary improvements to enhance the learning experience. Therefore, the authors introduced the 'easier to adjust by teachers' cluster, encompassing aspects inside the classroom not integrated into the existing structure. This allows teachers to customize these elements, aiming to provide additional benefits for students with hearing impairments in terms of learning effectiveness.

The aspects mentioned in the 'hard to change' category also happen to provide comfort, which is essential for the psychological safety of the students and could lead to increased engagement in the class. These are the prerequisite to exist if the teachers want the students to be ready and focused to learn in the class. Citing the ergonomics principle of Built Environment, factors that are relevant to provide comfort, include: visual field (lighting, natural and electrical), acoustic, and other configurations (temperature, air flow, and the size of the classroom).

On the other hand, the 'easier to adjust' category promotes function, meaning that these aspects support the students to function and learn optimally in the class by being able to tailor the elements to the students' specific needs and cultural behavior. Based on the Stimulation-Individualization-Naturalness principle, factors that contribute to provide function are those referenced in the stimulation and individualization groups, such as: classroom color, seating arrangement, and the furniture. Stimulation and individualization lead to personalized classrooms that could further cater DHH students needs, as DHH types varied from one student to another. Other than budget considerations, these personalizations can only be performed by the teachers.

Table 2: The proposed guideline for designing classrooms for
DHH high-school students in Indonesia

Category	Aspects need to be considered	Indicators and parameters
Hard to change by teachers, the ones that provide comfort	Classroom size	• The ideal size of the classroom needs to measure the users who will use the classroom daily (the age, the body scale), and what kind of activities they will perform daily in the classroom (Gaudiot et al, 2019; Harahap et al, 2020) • Minimum ratio of 3 m^2/students (Rahmat, 2016) • Ideal capacity of 8-10 people per classroom, assuming this is an ideal case to have effective 1-on-1 guidance from the teacher (Xue et al, 2020)
	Classroom structure	• The structure of the classroom needs to be strong and firm, not cracked, and the ceiling needs to have no leak (Widiastuti et al, 2020)

		• The building needs to comply with the disaster resistant regulations in the country, especially the natural disaster that often occurs (Lassa et al, 2022) • The classroom and the school needs to have standard operational procedures of what to do if disaster happens, including a color sign system to alert danger and a comprehensive evaluation process (Gaudiot et al, 2019; Lassa et al, 2022)
	Lighting	• Natural lighting could be improved by providing more windows with a certain size. This could be a method to save electrical spending and to utilize daylight (Barrett et al, 2015; Gaudiot et al, 2019; Manca et al, 2020; Oliviera et al, 2020; Harahap et al, 2020) • Electrical lighting needs to have a minimum 100 lux per class (Rachmat, 2016) *However*, considering there are differences in electrical capacity and classroom size in every DHH classroom in Indonesia, this aspect could be put as not a priority
	Air flow	• The existence of bigger windows mentioned above to support lighting, could also be considered to support airflow by providing the window with ventilation flow with a particular size and design (Barrett et al, 2015; Gaudiot et al, 2019; Manca et al,2 020; Widiastuti et al, 2020) • Ventilation holes need to be at least 15% of the floor surface area, and it needs to ensure the flow of >= 0.15 m/s (Rachmat, 2016)
	Temperature and humidity	• The windows (for promoting natural righting and air flow) need to be located on certain spots that minimize sun exposure aiming to reduce direct heat from the sun glare (Barrett et al, 2015) • To avoid sun exposure, the classroom could also be provided with some shades outside the room (Barrett et al, 2015) • Air humidity needs to be within the range of 40%-60% in order to avoid fatigue (Rachmat, 2016) • Overall temperature of the classroom needs to be within the range of 18C-28C, and will be better if there is a fan or an air conditioner so the people inside can control the temperature (Rahmat, 2016) *However*, considering there are differences in electrical capacity and supply stability in every DHH classroom in Indonesia, this aspect could be put as not a priority
	Acoustic	• For an unoccupied classroom, the sound level needs to be <= 30 dB, and for an occupied classroom it should be within the range of 50 dB - 85 dB in order to maintain effective communication and learning process inside the classroom and to avoid fatigue (Gremp et al, 2018; Manca et al, 2020; Taylor, 2020)

		• If possible, the wall materials, the floor materials, the ceiling tile, and the furniture materials need to not reflect the noise in order to maintain students' focus, and the materials could also be a good sound absorbing to avoid echoes (Gaudiot et al, 2019; Harahap et al, 2020; Manca et al, 2020; Oliviera et al, 2020)
Easier to adjust by teachers, the ones that provide function	Furniture	• The chairs and desk need to follow ergonomic principles, which accommodate natural resting positions, and with the height and the width following the body scale of the students. The top of the desk needs to be large enough to provide ample room for smooth sign language communication while also accommodating items on its surface (Barrett et al, 2016; Gaudiot et al, 2019; Manca et al, 2020) • The blackboard needs to be big enough to allow better view, and needs to be placed at the appropriate spot to avoid sun glare. It is better to use blackboard rather than whiteboard since the whiteboard tends to reflect the sunlight (Gaudiot et al, 2019) • Provide the classroom with cabinets that can store books and students' files as part of the standard operational procedure for mitigating natural disasters (Lassa et al, 2022)
	Classroom color	• Light or pastel colors on the walls (Barrett et al, 2015; Gaudiot et al, 2019; Harahap et al, 2020; Widiastuti et al, 2020) • It is better to not utilize lots of bright color and striking decoration since it would overstimulate high-school students visually (Barrett et al, 2015; Harahap et al, 2020)
	Seating arrangement	• Recommendation for seating layout: U-shape, semi-circle, or circular. It depends on the shape of the class whether it is a square or a rectangle, and depends on the number of students (Barrett et al, 2015; Gaudiot et al, 2019; Kushalnagar, 2019; Harahap et al, 2020; Manca et al, 2020; Taylor, 2020; Widiastuti et al, 2020; Xue et al, 2020) • The arrangement needs to provide enough range of visibility for each student. It is recommended that the students are put in a 45 degree shape so they can see the blackboard/the slides, the teachers, and their peers on their right and left sides (Gaudiot et al, 2019; Harahap et al, 2020)
	Additional learning tools and accessories	• It is better for the classroom to have visual signs and other visual information as cues to support accessibility, and to be included in the standard operational procedures for mitigating natural disasters (Barrett et al, 2015; Harahap et al, 2020)

The authors have made sure to incorporate DeafSpace principles in the aspects mentioned above to enhance accessibility and inclusivity for students who are deaf or hard of hearing. For example, selecting a U-shape or semi-circle seating arrangement aligns with the

principles of space and proximity, which would maintain the students' focus on visual communication. The inclusion of windows to maximize natural light, complemented by artificial lighting, demonstrates the application of light and color principles.

Limitations

In the course of reviewing relevant papers for the systematic literature review, the authors engaged in rigorous discussions to challenge each other's perspectives on specific studies. However, due to time constraints and a shortage of personnel, the authors did not conduct an inter-rater reliability assessment. It is advisable for future reviews to incorporate this assessment before beginning the systematic literature review process.

When synthesizing the results of the systematic literature review to create a comprehensive guideline, the authors employed thematic content analysis under expert supervision. However, the authors did not utilize a supporting methodology or conduct a readability test beforehand, again due to time constraints and limited personnel. To enhance future research, it would be beneficial to employ primary research methods such as interviews, focus group discussions, or surveys to evaluate the readability and usability of the guideline intended for implementation.

Acknowledgements

Appendix

Table 1: Result of systematic literature review

No.	Author	Title	Research Objective	Research Design	Participants: Number of Schools (n), Sample (pp), Age (yr), Country (c)	Relevant Results and Outcomes
1	Barrett et al	(2015) The impact of classroom design on pupils' learning: Final results of a holistic, multilevel analysis	To report the final results of HEAD (Holistic Evidence and Design) project To present different approach on examining good classroom design: SIN framework	Experimental design, quantitative and qualitative	n = 153 classroom of 27 schools pp = 3766 students yr = 5-11 years old c = England	● On Naturalness: classroom orientation towards more natural lighting alongside large windows for better air quality as well, but in Indonesia's equatorial position, glare and heat effects need careful consideration; improve electrical lighting, however, it is in lower priority for regions with limited electricity accessibility in Indonesia. ● On Ownerships or Individualisation: ergonomic furniture with flexible classroom arrangements, but flexibility could be a lesser priority for high school; distinctive design features to enhance learning engagement with consideration towards DHH students' visual reliance. ● On Stimulation: add decorations and balanced colors to create moderate room stimulation and not overwhelming for DHH students' heightened visual acuity.
2	Rachmat	(2016) Prevalence and Determinants of Fatigue among Private High School Students in Bogor Tengah Sub-district, Indonesia	To find the relationship between classroom's physical environmental conditions towards fatigue among high school students	Quantitative	n = 10 private high schools pp = 288 students yr = 15-17 years old c = Indonesia	● Various factors for designing a comfortable classroom to reduce physical fatigue and enhance motivation, including: classroom size with minimum ratio of 3 m2 per learner, and room capacity no more than 30 people; light intensity with minimum 100 lux; noise level with maximum of 85dB, with also considering school location not too close to the main road of the city; provide mechanical ventilation holes equivalent to at least 15% of the floor surface area; maintain a temperature range of 18-28°C, air humidity between 40-60%, and airflow exceeding 0.15m/s. Consider the availability of air conditioners. However, given budget

					limitations in building schools in Indonesia, we view this as a lower priority. ● The study quantitatively identified key factors impacting student physical fatigue: humidity, temperature, airflow, and air conditioner availability.
3	Gremp et al	(2018) A Descriptive Analysis of Noise in Classrooms across the US and Canada for Children who are Deaf and Hard of Hearing	To obtain sound levels and acoustic characteristics in classrooms that serve DHH children	Experimental design, quantitative	n = 19 schools/42 classrooms pp = 300++ K-2 students yr = 5-7 y.o c = USA and Canada	● The study suggests assessing various aspects related to sounds in DHH classrooms: provide separate classrooms (instruction or inclusive) based on the sound level connected with its location, the sound level of an unoccupied classroom is <= 30 dB (with an overall sound level of around 70 dB to maintain a signal-to-noise ratio of +15 dB), limit the reverberation time of a 10,000 cubic feet classroom to no greater than 0.6 seconds. ● The proposals above would affect wall, floor, ceiling tile, and furniture materials.
4	Kushal nagar	(2019) A Classroom Accessibility Analysis App for Deaf Students	To make an assessment of the architectural visuals effect on the DHH students by using simple accessibility app	Experimental design, quantitative	pp = 15 students yr = >16 y.o c = USA	Besides that there was a strong correlation between participant ratings (on the classroom layout/classroom architecture visuals) and the Classroom Analysis App for accessibility, the study proposed that circular layout is recommended to be used by DHH students in classrooms since it promotes accessibility the most.
5	Gaudiot et al	(2019) The Classroom Built Environment as An Inclusive Learning Process for the Deaf Students: Contribution of Ergonomics in Design	To make an assessment of classroom design for DHH students to support their learning process, based on Built Environment evaluation	Literature review	n paper = 15 papers c = worldwide	● Based on the ergonomics principle of Built Environment, the study highlighted several aspects in the classroom, such as: its size using the student scale, arrangement promoting comfort for the students, promoting natural lighting that minimize direct sun's influence, and room dimensions determined primarily by the students and the various activities. ● Applying Human-Task-Environment principles, the study suggests focusing on several aspects, including: walls and flooring materials need to allow reverberation (helps the acoustics of the classroom), wall coloured in light or pastel colors (provide stimulation), seating arrangement allow participation

					of all DHH students by increasing visual control (e.g. in circular layout, or put them the students in a 45 degrees of shape), big blackboard for better view and spacious desks allowing seamless sign language communication yet keeping the objects on the top, furniture placed to provide comfort and safety.
6	Widiast uti et al	(2020) How classroom design impacts for student learning comfort: Architect perspective on designing classrooms	To determine the factors that affect student learning comfort in the classroom and its distribution	Qualitative and Quantitative (descriptive statistical analysis of survey)	n = several elementary schools (SD), junior high schools (SMP), and senior high schools (SMA) in Yogyakarta, under the same institution of Muhammadiy ah pp = 772 students (245 SD students, 265 SMP students, 262 SMA students) yr = 10-17 years old c = Indonesia	The study proposed several aspects emerged from students opinions, which could be considered in school and classroom, including: ● School building/outdoor theme: importance of a connection with nature, though it may not be a top priority since it is associated with the predetermined school location; emphasis on building strength and durability for classroom safety; prioritize quietness by managing noise levels; considering lighting (both natural and electrical); provide air circulation/ ventilation; maintain the appropriate proportion of indoor space per learner. ● Classroom/indoor theme: adequate facilities is important, however, due to the various budgets on improving facilities, this might not be a priority to be put in the proposed guideline; cleanliness; study atmosphere (i.e. low noise level)' visual quality (e.g. decoration, wall color providing stimulation); space planning (i.e. classroom seating arrangement); lighting (both natural and electrical); air circulation or having air conditioners, however, we consider this as not a priority knowing budget limitations.

7	Manca et al	(2020) The Effect of School Design on Users' Responses: A Systematic Review (2008-	To find the impact of the educational environment design towards students' and teachers' performance	Systematic literature review	n paper = 68 papers yr = 7-12 years old c = worldwide	● Talking about the association between the indoor environmental features and users' psychological responses, the study proposed several aspects to consider, such as:
						  ○ The school needs to be not close to the road.
						  ○ Furniture materials need to not reflect the sound

		2017)			(Lombard effect). ○ Ventilation needs to be increased. ○ Lighting needs to use more natural light. ● Talking about the effect of classroom design and furniture on users, the study proposed some aspects to be assessed, including: ○ Classroom layout needs to have a flexible space (example: U-layout). ○ Chair and desk need to be ergonomic and accommodate a natural resting position. ○ The furniture needs to be in attractive colors. *However*, if this principle is implemented, we need to measure whether the 'attractive colors' would not be noise for the students.
8	Oliviera et al	(2020) The Application of Ergonomics of Built Environment Architectural Projects as a benefit for the Hearing Impaired	To assess building inclusivity and accessibility for DHH students based on DeafSpace principle	Literature review	n paper = 9 papers c = worldwide	The study proposed several principles that can be used in designing classrooms for DHH students. ● In terms of Accessibility of the Built Environment, aspects to be considered: ○ Understanding the environment for navigation. ○ Moving freely within both vertical and horizontal circulation areas. ○ Engaging in activities and using equipment and furniture. ○ Facilitating easy interaction between users and the environment. ● Talking about assessing Ergonomic design of the Built Environment, the classroom design needs to consider: ○ Comfort related to the surroundings. ○ The user's perspective towards the function. ○ The mental aspects of the users. ○ The factors related to completing tasks and the required sizes. ● In terms of taking DeafSpace principle, the classroom design needs to consider: ○ Sensory range ○ Space and proximity

					○ Mobility ○ Light and color ○ Acoustic and EMI
9	Harahap et al	(2020) Study of interiority application in deaf space based lecture space	To assess the accessibility of the lecture space in CADL-ITB (Institut Teknologi Bandung) building using DeafSpace principle	Experimental design, qualitative	pp = 72 participants yr = >16 y.o c = Indonesia	● The study proposed several aspects based on DeafSpace principle that needs to be existed in a classroom for DHH students, such as: ○ Consider U-shape or semi-circle seating positions ○ Provide large amount of wiggle space ○ Use fresh colors and natural lighting ○ Use soundproof material
10	Taylor	(2020) One-Stop Lesson Planning: How Universal Design for Learning Can Help Students Who Are Deaf or Hard of Hearing	To promote Universal Design for Learning (DHH) principles in designing lesson plan and activities inside the classroom	Literature review	n paper = 5 papers c = USA	The study proposed that in order to increase engagement and motivation of students in the classroom, it needs to be designed by considering several aspects, such as: ○ Classroom layout or arrangement needs to utilize flexible seating ○ Allow access to quiet spots when it comes to small groups discussion
11	Xue et al	(2020) Study on the classroom attention mechanism of deaf students based on three-in-one education model	To improve deaf students' learning attention by promoting three-in-one educational model	Experimental design, qualitative	pp = 292 DHH students yr = >16 y.o c = China	The study resulted in mapping influencing factors for deaf people's attention: unintentional, intentional, and external. Talking about how the external environment might influence deaf students' attention, the classroom design needs to consider several aspects, including: ○ Classroom size needs to accommodate 8-10 people so it can cater 1on1 guidance of teachers ○ Classroom layout needs to be in semi-circular ○ Wall and furniture materials need to be sound-absorbing
12	Lassa et al	(2022) Understanding the impacts of floods on learning quality, school facilities, and educational recovery in Indonesia	To assess the effect of floods on quality learning and educational infrastructure by utilizing comprehensive school safety framework	Qualitative	n = 100 schools pp = 80 headmasters and 21 students yr = - c = Indonesia	The study proposed that given Indonesia's susceptibility to disasters, school buildings should be designed with resilience in mind. Additionally, schools should establish standard operational procedures, encompassing immediate response protocols in the event of a disaster, as well as designated safe locations to ensure the safety of students.

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An Action Research on the Integration of Pinyin Instruction in Chinese Language Teaching Through the Use of Object-Based Teaching Material

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Abstract

This research focuses on action research in the field of Mandarin Chinese teaching. It emphasizes the process and outcomes of converting unidirectional Mandarin pinyin materials into bidirectional interactive materials suitable for Interactive Whiteboards. Considering the equipment conditions of the research site, the researcher repurposed the Chinese Pinyin materials and practically applied them in the classroom for learners of Mandarin as a second language. The participants were 14 adult learners of Mandarin with a starting point of zero proficiency, all aged over 20, and were all enrolled in a visa program affiliated with a university's Mandarin Learning Center. To delve deeply into the teaching situation, this study utilized classroom recordings, teaching notes, converted materials, and classroom observations as research tools. Additionally, after class, learners were asked to fill out a feedback questionnaire designed using a Likert 5-point scale. Through descriptive statistical analysis of teaching recordings and questionnaire results, the study will offer suggestions and areas of improvement regarding learners' performance, teacher-student interaction, and the operation of the Interactive Whiteboard. This research seeks to answer three main questions: (1) What are the principles for converting unidirectional lecture-based materials into bidirectional Interactive Whiteboard materials? (2) What are the teaching strategies for using Interactive Whiteboard materials in Mandarin teaching classrooms? And (3) What are the operational suggestions and areas of improvement for Interactive Whiteboard materials in Mandarin teaching classrooms? The results of the study will provide empirical recommendations for the digital Mandarin teaching field, hoping to make a modest contribution to this area.

Keywords: Interactive Whiteboard, Teaching Chinese as a Second Language, Object-Based Digital Materials, Digital Teaching, Chinese Pinyin

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1. Introduction: Interactive Whiteboards in Mandarin Chinese Teaching Classrooms

With the advancement of Information and Communication Technology (ICT), the educational environment has evolved from the early configurations of chalkboards or whiteboards and the use of traditional teaching resources such as paper materials, physical teaching aids, and videotapes, to the widespread use of digital devices and multimedia materials such as projectors, computers, and Interactive Whiteboards today, significantly enhancing teaching efficiency and diversity (Purdue Online & Purdue, 2023). In the context of the new normal, equipment such as Interactive Whiteboards, auto-focus cameras, and wireless microphones have become an indispensable part of Mandarin teaching. Moreover, the ability to proficiently utilize digital teaching platforms and tools has become a fundamental requirement for Mandarin teachers (Lian, 2021a). The use of emerging technologies like Interactive Whiteboards to effectively stimulate learning motivation and interactivity is a focal point of current educational concern.

2. Research Purpose

This research focuses on the Interactive Whiteboards as its main research tool, leveraging its software features such as material extraction, storage, IRS instant feedback, annotation, dragging, and browsing functionalities in Mandarin language classrooms. The study aims to convert traditional unidirectional Chinese Pinyin teaching materials into bidirectional, interactive digital materials. After the development of these materials, they will be practically applied in Mandarin classrooms through action research. The goal is to summarize the principles of transitioning from unidirectional to bidirectional interactive teaching materials and to thoroughly investigate the strategies for using Interactive Whiteboards in Mandarin teaching, as well as operational recommendations and potential directions for improvement. This endeavor seeks to contribute to the integration of educational technology in Mandarin teaching.

3. Literature Review

3.1 Interactive Whiteboards

With the development of information technology, Interactive Whiteboards have been widely used in various teaching fields. Research indicates that the interactive and visual benefits of Interactive Whiteboards can significantly enhance the quality of teaching, which is highly affirmed by educators (Hennessy & London, 2013). They not only replace traditional physical teaching methods but also, in conjunction with the SAMR model, facilitate the digital transformation of education. Interactive Whiteboards are powerful tools that can import, store, drag, annotate, etc., providing teachers with more flexible teaching operations and attracting students' attention with diverse presentations (Fawzi & Zuhrieh, 2011). The use of Interactive Whiteboards can promote students' memory and writing abilities, inject new vitality into the classroom, and enhance teacher-student interaction (Barbarić Pardanjac et al., 2018). Compared to traditional teaching methods, they make learning more intuitive and proactive, which is beneficial for the development of cognitive, affective, and psychomotor skills. In summary, Interactive Whiteboards have become an indispensable and important auxiliary tool in contemporary classrooms.

3.2 Object-Based Digital Teaching Materials

3.2.1 Teaching Methods for Interactive Whiteboards

Participatory teaching methods emphasize the active involvement of students in the learning process, placing them at the core of instruction and breaking away from the traditional unidirectional mode of delivery (Xie, 2008). By employing questioning, discussion, and case studies, these methods foster student engagement, which can enhance learning interest, initiative, and creative thinking (Ciobanu, 2018). Appropriate instructional design is also key to its success (Inguva et al., 2018). Object-based teaching focuses on the interaction between students and physical objects to deepen understanding and application of knowledge (Chatterjee & Hannan, 2015; Lin, 2023). Applying participatory teaching methods to Interactive Whiteboards instruction not only enhances classroom interaction but also improves learning outcomes, keeping students highly interested and focused (BECTA, 2007; Wang, 2016). In summary, integrating participatory strategies with Interactive -Whiteboards teaching is an effective instructional method adopted in contemporary classrooms.

3.2.2 Object-Based Digital Teaching Materials

According to the research by Netolicka and Simonova (2017), educators can effectively create visual teaching resources using the SMART Notebook. Moreover, these virtual teaching materials are not only durable but can also be modified and manipulated according to needs, providing convenience for future teaching. Owens (2012) further suggests that designing course materials with SMART Notebook and incorporating its diverse functions to create various teaching activities, such as competitions, games, and assessments, can shift the teaching focus to a student-centered approach. This not only increases student participation but also stimulates their curiosity, thereby enhancing their motivation to learn. SMART Notebook, in instructional design, not only increases students' interest and motivation but also immerses them in learning through the novel experience of touch interaction, achieving a state of flow and thus enhancing learning effectiveness. Owens also believes that this tool should be used to support student collaboration in small groups to help them achieve specific learning objectives. Xu (2012) also mentions in his research that SMART Notebook has a variety of powerful features, such as adjusting image transparency, combining and splitting images, as well as copying and locking objects; it also includes functions like hyperlinks, flipping, spotlight, and screen masking, making the creation of Interactive Whiteboards multimedia materials much easier. In summary, these studies indicate the SMART Notebook provides educators with a set of strategies to accommodate different learning styles and needs in the classroom.

In the field of Mandarin teaching, using Interactive Whiteboards in conjunction with object-based digital materials has become an important teaching strategy to promote classroom interactivity. Lin (2023) points out in her research that the use of object-based digital materials on Interactive Whiteboards significantly aids cognitive development and skill practice for students through actions such as "dragging," "writing," and "touching the screen," effectively stimulating learners' perceptual potential. According to the nine stages of learning proposed by Gagnè (1985), it is confirmed that using object-based digital materials in Interactive Whiteboards teaching can strengthen learners' intrinsic motivation. Using Interactive Whiteboards as a teaching tool and integrating digital objects into teaching materials has not only become a popular strategy in teaching but also highlights the

feasibility and advantages of combining object-based materials with Interactive Whiteboards in Mandarin teaching.

3.3 Digital Chinese Pinyin Teaching

In the field of Mandarin teaching, integrating multimedia objects has become a preferred strategy. In the digital teaching of Chinese Pinyin, educators can utilize various multimedia resources such as videos, audio, animations, and interactive games to enrich the content of instruction. Huang (2010) discusses the benefits of multimedia teaching, noting that it can stimulate multiple senses of learners simultaneously, thereby enhancing memory retention. Multimedia objects not only facilitate the execution of the teaching process but also bring a variety of stimuli to learners, further improving learning effectiveness. Ren (2010) in his research on the design of Chinese Pinyin teaching materials using multimedia, also mentions that the use of hyperlinks can integrate reading and practice more systematically. Citing the dual-coding theory (Mayer, 2002), he explains that presenting Pinyin symbols in specific colors through animation effects, which provide both visual and auditory stimuli, aids learners in recognition and absorption.

Huang and Ren further suggest that corresponding oral diagrams or animations should be added to multimedia Chinese Pinyin teaching materials or classrooms to simulate the pronunciation parts and their operations, helping learners to understand the mechanism of Chinese Pinyin pronunciation in depth. Additionally, using recording functions to document learners' vocal practice is an effective strategy; educators can provide immediate corrections to learners' pronunciation through these recordings.

In the realm of Chinese Pinyin instruction, we have witnessed the evolution from traditional paper-based materials to digital teaching resources. With the introduction of digital technology, contemporary teaching strategies have integrated visual, auditory, and interactive elements, not only creating a more efficient and engaging teaching model for educators but also presenting a more attractive and effective learning experience for learners. However, to fully realize the advantages of digital Chinese Pinyin teaching, depends on educators possessing a profound literacy in digital education and combining appropriate instructional design and execution strategies.

3.4 The Utilization of Bloom's Cognitive Taxonomy in Teaching Strategies

3.4.1 Bloom's Taxonomy 2.0

Bloom's Taxonomy of Educational Objectives is a systematic classification of educational goals. This framework was originally developed by Benjamin Bloom in 1956, with the intention of enhancing the quality of instruction and improving teaching outcomes. The taxonomy has profound implications for curriculum design, teaching assessment, and the evaluation of learning outcomes. The original classification focused primarily on the cognitive domain of educational objectives; however, in 2001, Anderson and Krathwohl revised it, expanding it to include the affective domain and the psychomotor domain, thus making it more relevant to contemporary educational needs. According to the research by Lin (2023), Bloom's taxonomy aims to encourage educators to delve deeply into the cognitive, skill, and attitudinal domains of teaching. Within the cognitive domain, the taxonomy categorizes learning objectives into six levels, ranging from basic to higher-order: Remembering: the ability to recall learned knowledge, Understanding: the ability to grasp the

meaning of learned material, Applying: the ability to use learned material in new situations, Analyzing: the ability to explain the underlying meanings or principles of learned knowledge so that others can understand the conveyed content, Evaluating: the ability to organize learned knowledge into a systematic structure of one's own, and Creating: the ability to critique objects or information encountered based on previously learned knowledge or methods. The hierarchy is illustrated as follows:
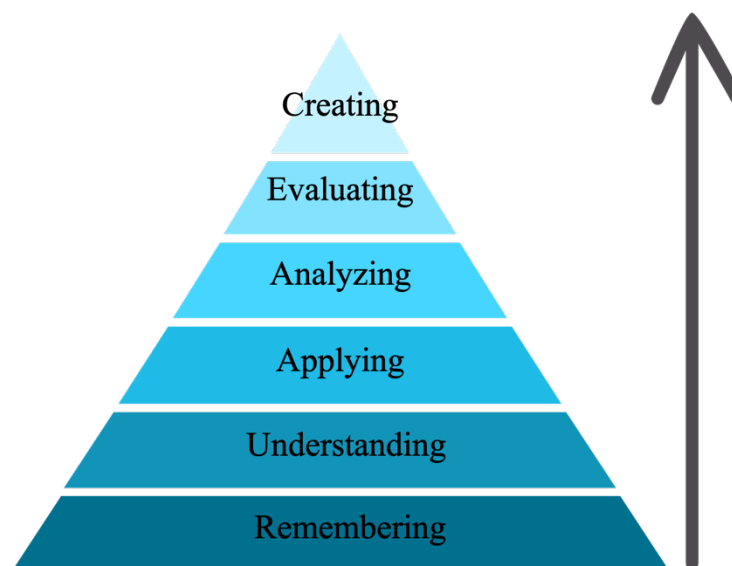
Figure 1: Bloom Taxonomy Level 2.0 (Huitt, 2011)

Bloom's Taxonomy emphasizes the transformation of educational expectations into tiered instructional objectives, which are then used to systematically formulate curricula to enhance learning outcomes (Lin, 2023). Based on this classification, Anderson and Krathwohl (2001) proposed a series of instructional verbs (Huitt, 2011), providing educators with clear guidance that aligns with student learning needs. Through these verbs, educators can clearly grasp teaching objectives, and students can more precisely understand their learning purposes, thereby optimizing the quality of teaching and learning. In summary, the instructional verbs within Bloom's Taxonomy enable educators to effectively translate teaching expectations into tiered objectives, systematically design curricula, and improve learning motivation and outcomes.

3.4.2 Teaching Strategies

As educational technology advances, teaching strategies continue to evolve from a singular model of knowledge transmission to one that emphasizes diversity, interactivity, and student-centeredness. For instance, the Direct Method emphasizes intuitive knowledge conveyance, while game-based learning uses game interactions to deepen understanding, prompting encourages autonomous exploration, demonstration teaching showcases skills, and cooperative learning emphasizes teamwork (ViewSonic Library, 2020). These strategies aim to stimulate learning potential and promote student development. In the context of interactive materials, educators should develop appropriate strategies to guide students in acquiring knowledge and correctly operating the materials (Lin, 2023; Merrill et al., 1991). Borsook and Higginbotham (1991) propose seven elements for the design of interactive materials: immediacy of response, non-linear access to information, adaptability, feedback, options, bi-directional communication, and information granularity. In summary, contemporary

teaching strategies emphasize diversity, interactivity, and a student-centered approach, and educators should formulate appropriate strategies in conjunction with the characteristics of the materials to maximize teaching effectiveness.

4. Research Methods

This study employed action research methodology, following Lewin's (1946) four steps of planning, action, observation, and reflection, to apply Pinyin teaching materials on an Interactive Whiteboard for Mandarin language instruction, observing its impact and feasibility in the teaching environment. The subjects were 14 Mandarin language learners over the age of twenty with no prior knowledge of the language, including 2 from Indonesia, 1 from South Korea, 8 from Thailand, 1 from Honduras, and 2 from Vietnam. The instructional experiment was conducted over approximately 9 sessions, each lasting 50 minutes. The research setting was a Mandarin Language Teaching Center at a university in Taiwan, equipped with Interactive Whiteboards and other devices to meet the needs of a blended teaching approach. The teaching process involved video recording, observational note-taking, and after-class feedback questionnaires and interviews with learners to understand their perceptions of using the Interactive Whiteboard. This study utilized the myViewBoard software to adapt the teaching materials for the Interactive Whiteboards, conducting an instructional experiment to observe the impact and feasibility of Interactive Whiteboards in Mandarin language teaching.

5. Result

5.1 The Principles for Converting One-Way Lecture-Based Materials Into Two-Way Interactive Whiteboard Materials

In the realm of pedagogical methodologies, Bloom's Taxonomy stands as a foundational framework enabling educators to systematically fulfill predefined educational objectives. The present study seeks to innovate the realm of Pinyin instruction by transforming static PowerPoint resources into dynamic, two-way interactive materials, facilitated by the specialized capabilities of Interactive Whiteboard software. This conversion process is characterized by the strategic employment of the software's unique design functionalities to construct progressive exercise activities that address and rectify the limitations inherent in the original one-directional materials.

The research strategy involves a structured division of Pinyin instructional content into four principal segments, organized in alignment with their pedagogical sequence: Finals, Initials, Tones, and Rules. The investigative thrust will revolve around devising a set of detailed guidelines and standards for the conversion of linear instructional materials into reciprocal, interactive resources optimized for use with Interactive Whiteboards. This framework will be informed by the instructional verbs outlined in Bloom's Taxonomy.

At the Remembering level, educators are poised to employ interactive objects and strategic organization within the material to facilitate memory and description. Provision for written output will be incorporated within the material's layout, enabling notation, while Pinyin symbols sharing phonetic characteristics will be grouped and linked for easy listing. Progressing to the Understanding level, space for annotation will again be allocated, with imagery integrated via the whiteboard's multimedia functionalities to enhance associative learning, while touch control mechanisms will be harnessed for instructional follow-through.

As the curriculum escalates to the Applying stage, educators will be encouraged to mark Pinyin symbols unobtrusively on page corners, easing the cognitive load of learners and supporting demonstration. Integration of auditory elements with Pinyin symbols will enhance whiteboard writing exercises, aiding in selection, while hyperlinked audio within questions will bolster teaching efficacy and self-assessment through examination. The Analyzing level mandates a simplification of Pinyin learning through strategic symbol placement, the design of interactive Pinyin objects for comparative learning, and the creation of sorting activities to aid in distinguishing phonetic nuances.

Evaluating level strategies encompass the design of engaging games like Sticky ball or Scratch-off to randomize Pinyin symbol practice for sound selection, alongside the creation of dictation exercises and audio playback for assessment purposes. Lastly, at the pinnacle of Bloom's Taxonomy—the Creating level—educators will facilitate the separation and recombination of initials, finals, and tones, guiding learners through interactive practice for Pinyin recognition, and utilizing Instant Response Systems to prompt impromptu Pinyin spelling by learners, thus fostering real-time correction and heightened engagement for reorganization.

5.2 Teaching Strategies for Applying Interactive Whiteboards to Chinese Pinyin Teaching

In the classroom, a concept may be suitably introduced through more than a teaching strategy to guide learners in absorbing and applying the knowledge, while simultaneously employing multiple teaching strategies. The researcher will summarize and organize the teaching strategies applicable to the use of Interactive Whiteboards in Chinese Pinyin instruction based on the teaching strategies proposed by the ViewSonic Library (2020) through a literature review. The Direct Instruction method, as a traditional and proven effective model, emphasizes the teacher's leading role and intuitive teaching. With the aid of Interactive Whiteboards, teachers can instantly display multimedia materials and use annotation functions to enhance students' understanding. Play-based learning, especially gamified learning, provides an environment where education is integrated with fun, allowing students to develop social interaction and critical thinking within the game. Interactive tools on Interactive Whiteboards, such as dice and spinners, empower students to control the learning process, thereby enhancing motivation. Digital game-based learning further combines instructional content with game elements, using board games and computer games to promote a deeper understanding of basic concepts. Educational software for Interactive Whiteboards can design various interactive games, such as snakes and ladders and scratch cards, to alleviate learning pressure. The Prompting method guides students to explore answers through questions and suggestions, aiming to motivate students to exceed learning objectives. The magnifying glass or masking functions of Interactive Whiteboards can provide timely assistance during the teaching process, especially in learning spelling rules, where phased exercises help students consolidate knowledge. The demonstration teaching method guides students step by step through the teacher's demonstration, which is particularly common in problem-solving or step-by-step instruction. Interactive Whiteboards can display tongue position diagrams and audio files to help students learn correct pronunciation. Cooperative learning encourages students to work in teams to achieve learning objectives. The grouping function of Interactive Whiteboards and educational software can design cooperative activities to promote mutual learning among students. The Think/Pair/Share strategy focuses on a student-led learning process, where students exchange thoughts within small groups. The drag-and-drop function of Interactive Whiteboards can be used to design pairing

exercises to facilitate discussion among students. Peer-Assisted Learning Strategies give students the lead in the learning environment, with the teacher playing a supporting role. The game design function of Interactive Whiteboards allows students to think, discuss, and correct each other in group activities, thus deepening the understanding and application of knowledge. The application of these teaching methods not only improves teaching efficiency but also enhances the learning experience of students.

5.3 Classroom Feedback Questionnaire

Following the implementation of the action research cycle, the researcher asked the study participants to fill out a classroom feedback questionnaire created using the Likert Scale. Each question had five options, ranging from 1 to 5, representing "strongly disagree," "disagree," "neutral," "agree," and "strongly agree," respectively. The questionnaire was translated into the participants' native languages before being distributed for completion. A total of 14 participants filled out the questionnaire, with nationalities including 2 from Indonesia, 1 from South Korea, 8 from Thailand, 1 from Honduras, and 2 from Vietnam. The researcher calculated the number of respondents per question, the average score, and the standard deviation (SD), with the average and standard deviation reported to two decimal places.

The questionnaire was divided into three parts: 11 questions on the course itself (C1-C11), 4 questions on unidirectional lecture-style materials (P1-P4), and 12 questions on bidirectional interactive materials (M1-M12), each numbered accordingly and analyzed for internal consistency using the SPSS system. For the course section C1-C11, the alpha value was 0.785, with a standardized item alpha of 0.848; for the unidirectional lecture-style material section P1-P4, the alpha value was 0.745, with a standardized item alpha of 0.778; for the bidirectional interactive material section M1-M12, the alpha value was 0.911, with a standardized item alpha of 0.923, all indicating a high degree of correlation.

In evaluating the effectiveness of the Pinyin course, students gave high ratings to the course's interest, teaching methods, interactivity of the materials, and the teacher's teaching attitude. Feedback from the course section indicated that the majority of students (10) strongly agreed that the course was interesting (C1) and believed that the course provided clear guidance on pronunciation (C3), with an average score of 4.57 and a standard deviation of around 0.78, showing consistency in student opinions. Furthermore, students generally believed that the teacher's guidance (C5) and patient teaching (C6) were crucial to learning Pinyin, with average scores of 4.79 and 4.71, respectively, and standard deviations of 0.6 and 0.63, indicating a high consensus on the positive evaluation of the teacher.

Regarding the materials, whether it was the unidirectional lecture-style Microsoft PowerPoint materials (P1-P4) or the bidirectional interactive myViewBoard materials (M1-M12), students provided very positive feedback. In particular, the fun (M9-M11) and convenience (M7) of the myViewBoard materials received the highest average scores of 4.86, with a standard deviation of 0.55, showing a high level of satisfaction and agreement among students. Students felt that these materials not only enriched the classroom content but also increased their interest and efficiency in learning Pinyin.

Overall, this feedback indicates that students have a positive attitude towards the design and implementation of the Pinyin course and believe that the teaching methods and material

design effectively facilitated Pinyin learning. These results provide positive guidance for further improving course design and teaching methods.

5.4 Semi-structured Interview

After the study participants completed the post-class feedback questionnaire, the researcher inquired about their willingness to participate in interviews and conducted semi-structured interviews with those who agreed. A total of 7 participants were interviewed, including 5 from Thailand and 2 from Vietnam. There were 8 interview questions, which were translated into the native languages of the interviewees according to their nationalities. The questions were divided into four categories: one on the course aspect, three on the material aspect, two on the operational aspect, and two on other aspects. Based on the responses from the interviewees, the following conclusions can be drawn:

Learners generally had a positive experience with the Pinyin course, the materials used, and the use of the interactive whiteboard. Interviewees from Vietnam and Thailand unanimously agreed that the Pinyin course was substantially helpful in their study of Mandarin, finding the course easy to understand and engaging. Particularly, the Interactive Whiteboard as a teaching tool was highly praised by the learners; they found it not only convenient and user-friendly but also effective in enhancing learning interest and efficiency through gamified teaching. Learners gave positive feedback on the interactivity of the Interactive Whiteboard materials and the technological approach to teaching, believing that these features helped them quickly absorb new knowledge and vocabulary.

In terms of material content, learners generally felt that the current materials were already very comprehensive and did not suggest any need for improvement or additional features. They indicated that the existing material design met their learning needs and that visual teaching through the Interactive Whiteboard made the learning process more intuitive and efficient. Moreover, students also believed that the Interactive Whiteboards were not only suitable for Pinyin learning but could also be effectively used for other areas of Mandarin learning, such as vocabulary and sentence teaching.

Overall, learners affirmed the application of Interactive Whiteboards in Mandarin teaching and expressed gratitude and satisfaction with the teacher's teaching methods. They felt that the teacher's instruction was already very effective, with no additional suggestions or comments. This indicates that the Interactive Whiteboard, as a teaching tool, plays a significant role in enhancing the effectiveness of Mandarin teaching and the learning experience of students.

6. Conclusion and Suggestions

Regarding the conversion of unidirectional expository materials into bidirectional interactive materials, teachers should be able to successfully complete the conversion if they follow the principles set forth in Section 5 and pair them with appropriate teaching strategies. The study subjects all gave high evaluations for the conversion of unidirectional expository materials into bidirectional interactive materials. As for the Pinyin course, according to the results of questionnaires and interviews, the Pinyin course received high praise from students, especially in terms of the course's interest, clarity of pronunciation, and the teacher's teaching methods, all of which received enthusiastic feedback from students. Regarding the converted materials, whether using Microsoft PowerPoint or myViewBoard as a teaching tool, students

gave positive evaluations. Among them, myViewBoard, due to its high interactivity and diversity, was considered an effective tool for helping students learn Pinyin. Concerning the benefits of teaching tools, the tools used by teachers in the classroom, such as myViewBoard, not only increased students' interest in learning but also helped them better grasp Pinyin. Students also believed that the teacher's proficient operation and problem-solving abilities were key to the success of the course. Regarding the aspect of learning attitude, although some students felt nervous during class, overall, students had a positive attitude towards the Pinyin course, finding it interesting and helpful for learning. However, during the operation or conversion process, some difficulties might be encountered, causing disruptions or limitations in the conversion process or teaching. The researcher will now provide operational and teaching suggestions based on the observations recorded during the conversion process, the teaching process, and the opinions of the study subjects.

1. Continued Use of myViewBoard: Given the high praise for myViewBoard from students, it is recommended that teachers continue to use this tool in subsequent courses. To further stimulate students' interest in learning, teachers can explore the various interactive features within myViewBoard.

2. Strengthen Game-Based Teaching: Considering that students found the games in the Interactive Whiteboard materials to be significantly helpful for learning, it is recommended that teachers incorporate more game elements when designing courses to enhance students' motivation and learning outcomes.

3. Expand Teaching Content: The Interactive Whiteboard is not only suitable for Pinyin teaching but can also be applied to other Mandarin courses, such as vocabulary and sentence learning. Teachers are encouraged to consider integrating the Interactive Whiteboard into more courses to provide a more diverse learning experience for students.

4. Attention to Students' Emotional Needs: Given that some students may feel nervous during class, it is recommended that teachers include more relaxation and interactive sessions in the course design to reduce students' anxiety.

5. Optimize Material Operation: Considering system limitations, it is recommended that teachers control the number of pages to less than 50 when creating materials to avoid crashes on standard Windows system computers. If using a large screen, the number of pages should be controlled to less than 100. Regarding the limitations of fade-in and fade-out animations, teachers are advised to plan the sequence of object appearances in advance when designing materials to ensure smooth teaching. When using the Interactive Whiteboards, since only one link can be selected at a time, it is recommended that teachers plan the links in advance to ensure that teaching is not disrupted.

In summary, despite some operational limitations of myViewBoard, its benefits in teaching cannot be overlooked. Teachers are advised to consider the above suggestions when operating or converting materials to ensure smooth teaching and effective student learning.

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The Development of Assessment Process for Undergraduate Students' Learning Outcomes According to OBE Model

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Abstract

The outcome-based education (OBE) focuses on an articulated idea of what skills and knowledge the students need to have after learning in course, especially used for occupation. The academic programs in university were designed and continuously improved for up to date according to the stakeholders' requirement before offering to students. Examination or post-test generally is a method for student assessment by evaluating abilities and achievements in every classroom to analyze the effective teaching. This case study showed the development process of learning outcomes assessment for 45 and 55 undergraduate students of 1st year and 2nd year by setting an activity as exhibition model for creative work called "Yearly Micro-Project" in the program of Packaging and Printing Technology, King Mongkut's University of Technology Thonburi, Thailand. For the 4-year curriculum, the year learning outcomes (YLO) of undergraduate students were set to assess KSA (Knowledge + Skills + Attitude) after the end of each academic year. The students gathered all knowledge to create works according to the problems specified by the instructors for presentation of their design and production process for printing and packaging materials. An assessment with Microsoft Forms of rating criteria (Rubric score) on 5-level was created for assessors who attend the exhibition activity could easily give the scores to each student. The advisors followed up on the progress of their work, collecting assessment results and summarizing student learning outcomes. The satisfaction of students and teachers for this project were evaluated, indicating that this learning outcome assessment method was very appropriate.

Keywords: Outcome-Based Education, Year Learning Outcome, Rubic Score

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Introduction

The traditional education system for higher education which focuses on scoring good marks rather than learning actual skills or gaining practical knowledge, is outdated. Presently, to avoid the problem of unemployment for the graduated students, the university needs to switch to an outcome-based education (OBE) system that focuses on the actual outcome of the course and not just grades [1]. The King Mongkut's University of Technology Thonburi (KMUTT) has been working to meet the standards set by the Ministry of Higher Education, Science, Research, and Innovation, Thailand to enhance the quality of education, research, and innovation by improving teaching and learning processes by implementing OBE principles. The academic staff then develop their courses by applying technology, innovation, and new teaching methods to develop students' learning outcomes and assessment tools. The OBE focuses on an articulated idea of what skills and knowledge the students need to have after learning in course, especially used for occupation. The traditional student assessment methods had been generally examination or post-test to evaluate the achievements of teaching and learning.

The curriculums of all academic programs in university had to be continuously designed and improved for up to date according to the stakeholder requirement every 4 years. Since the curriculum of Bachelor of Science program in Packaging and Printing Technology at KMUTT was improved in the academic year 2022, a new assessment process of undergraduate students learning outcomes has been applied. After the Program Learning Outcomes (PLO) were established, the Year Learning Outcomes (YLO) according to the PLO was issued for assessment in terms of knowledge, skills, and attitudes (KSA) based on the principles of OBE and followed the Backward Design. The constructive alignment approach was applied to ensure the achievement of learning outcomes as expected which were assessed using a 5-level score based on holistic rubrics following Bloom's Taxonomy [2] for a comprehensive evaluation, as Figure 1.
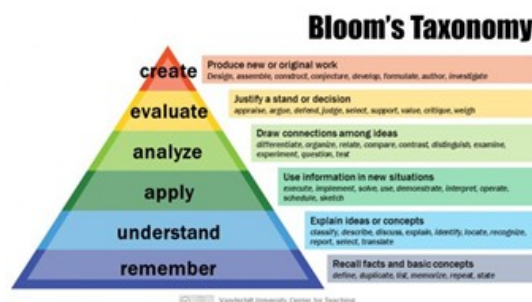
Figure 1: Bloom's Taxonomy Learning Theory

To test the effectiveness of the OBE assessment system, the first year and the second-year undergraduate students were individual evaluated with a 5-level score rubric using Microsoft Forms by the instructors of the program through the student's work as assignment. This activity of work presentation to evaluate as YLO was organized as an exhibition namely "Yearly Micro-Projects" where the students applied their knowledge in an academic year (2 semesters). The advisors of the students who explained the assignments, had to follow the work progress, summarize their learning outcomes from the assessment results, and gave feedback to help students improve their learning experience. After completing the activities, the information of opinions and satisfaction of the students and instructors to the Yearly Micro-Project activities were collected using Microsoft Forms for further improvement.

Methodology

Designation of Learning Outcome Assessment

The research methodology for the development of a learning outcome assessment for 45 first-year undergraduate students and 55 second-year undergraduate students in the Packaging and Printing Technology program. The "Constructive Alignment" concept was used as a technique to develop the students and learning activities to achieve the goal, which refers to the "triangle of learning"[3], as Figure 2.
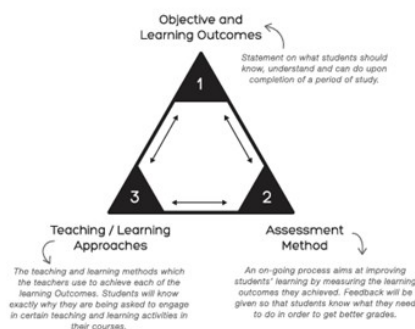
Figure 2: Constructive Alignment Concept

In this program specification, the learning outcome (LO) is carried out according to the principle of backward design and distributed to each subject by providing the course learning outcome (CLO) in alignment with the OBE concept, which contain 1-2 topics and begin with a verb, as shown in Table 1 and 2. The student learning outcomes stated what students are expected to know or be able to do upon completion of a course or a program, which should be clear, observable and measurable, and reflect what will be included in the course requirements (assignments, exams, projects, etc.). In addition to assessment for each subject, the yearly student learning outcomes as the requirement are shown in Figure 3, which could be assessed from the project results that they applied the integrated KSA of all subjects in an academic year of 2022.

Semester/ Academic Year	Course	Instructor	Course Learning Outcome (CLO)
1/2022	Basic Packaging and Printing	A, B	1. Identify the printing systems suitable for print and packaging production. 2. Identify the packaging types and select appropriate packaging for the products.
1/2022	Drawing and Photo for Packaging and Printing	C	1. Create the proper three-dimensional model of packaging. 2. Select appropriate graphics for the project concept.
1/2022	Layout design	C	1. Choose a proper software for printed product design. 2. Use a proper layout for graphic composition.
2/2022	Basic science for Packaging and Printing	D	1. Identify the types of solvents and polymers used in packaging and printing. 2. Identify the types of microorganisms.
2/2022	Prepress process	C, E	1. Prepare files compatible with the printing system.

Table 1: Examples of Course Learning Outcomes (CLO) for
the first-year undergraduate students

Semester/ Academic Year	Subjects	Instructor	Course Learning Outcome (CLO)
1/2022	Printing ink	D	1. Choose the proper printing ink type for the printed products. 2. Test the basic properties of the printing ink.
1/2022	Glass and Metal	F	1. Compare and choose proper glass and metal substrates for application. 2. Test the basic properties of glass and metal substrates.
1/2022	Paper and Wood	A	1. Select the appropriate paper types for packaging use. 2. Make the paper packaging and test the basic properties.
1/2022	Offset printing	B	1. Choose the proper substrates for offset printing. 2. Produce printed products with the offset printing system.
2/2022	Packaging Design	C, G	1. Design the proper packaging correctly.
2/2022	Color Management System	F	1. Create a color profile for the printing. 2. Set the color management system.
2/2022	Post press process	H	1. Choose the proper technique for post-press.
2/2022	Digital printing	D	1. Choose the proper digital printing system. 2. Inspect the print quality of digital printing.
2/2022	Screen printing	E	1. Produce the printed products with screen printing system.

Table 2: Examples of Course Learning Outcomes (CLO) for
the second-year undergraduate students

Figure 3: Year Learning Outcomes (YLO) of the Printing and Packaging Technology
Program for the first, second, third, and fourth academic year

To effectively evaluate the YLO of the students, the activity process for the project
presentation was designed to be carried out in a short time. The assessment tools were then

created by applying the learning theory of Bloom's Taxonomy to measure the learners' level of learning. Before the simulated exhibition for the students' project was organized to show the evidence of learning outcome, the students had to submit their works to the program administrators, as the list in Table 3.

1st Year Student	2nd Year Student
- work file in pdf	- project report (A4)
- sample of packaging selected	- poster (A3)
- project report (A4)	
- poster (A3)	

Table 3: The evidence for submission to present the students learning outcomes

Creation of Assessment Form

The assessment tools were conducted using a Holistic Rubric format [4], which means that the assessment criteria are not separated for each subject but are evaluated as a whole work results. The assessment tools using the Microsoft Forms with 5-level rating score system (level 1: very poor to level 5: very good) with a total weighted score of 100%, which would impact the student's grades. The assessment topics were based on the completion of individual student projects that were assigned to them. In this process, the instructors evaluated all students in knowledge, skills, and attitudes (KSA) because they had to apply their knowledge acquired from all subjects for one academic year to create and present their projects as required. The CLO of each subject was assessed by the subject instructor, while all instructors in this program had to assess the overall qualities from the project work as assignment, as shown in Table 4 and 5.

Subjects	Course Learning Outcome (CLO)	Weight	Assessment Criteria (Rubric Score)				
			1	**2**	**3**	**4**	**5**
Printing ink 1/2022	1. Choose the proper printing ink type for the printed products.	60%	Choose the wrong printing ink types.	Unable to explain the properties and usage of the printing ink.	Able to choose and explain the usage.	Able to choose and explain the printing ink components.	Suggest the printing ink development.
	2. Test the basic properties of the printing ink.	40%	Unable to know tools and methods for printing ink test.	Using the wrong tools and test methods to meet the requirement.	Using the right tools and test methods to meet the requirement.	Explain the results of property test.	Suggest the printing ink property development.
Digital printing 2/2022	1. Choose the proper digital printing system.	50%	Choose the wrong digital printing systems.	Choose the right digital printing systems.	Able to explain the digital printer and digital printing production.	Able to solve the printing problems appropriately.	Suggest the digital printing improvement.
	2. Inspect the print quality of digital printing.	50%	Unable to know the digital printing quality inspection.	Choose the wrong method of printing quality inspection.	Choose the right method of printing quality inspection.	Able to explain the printing quality inspection.	Suggest the solutions of printing problems.

Table 4: Examples of CLO assessment for each subject using a Holistic Rubric

1	2	3	4	5
The work was not beneficial and tends to impact the community, society, environment, etc.	The work was not suitable for use or is incorrect.	The work was created with the appropriate knowledge of packaging and printing.	The knowledge of packaging and printing was correctly applied with the creative thinking.	The work was commercially benefit for community, society, environment, etc.

Table 5: The criteria for overall qualities of work assessment
with the Holistic Rubric of 5-level scoring scale

Organizing of Activity for Learning Outcome Assessment

The activity for learning outcome assessment was organized to enhance the process of OBE. The students should incorporate knowledge (K), skills (S), and attitudes (A) as fundamental of learning to create the project assigned by the instructors. The students had to create their projects aligned with the expected Year Learning Outcomes (YLO) and presented in the event as an exhibition called 'Yearly Micro-Project', and the process was carried out sequentially, as shown in Figure 4.

The qualities of student's project work, presentation, and answering ability that indicate their learning outcomes were assessed personally by the instructors, academic staffs, and supporting staffs. Before the event occurs, the year advisors of students must meet with the students to explain the project requirement details. The students should present their projects to the assessors by applying their knowledge acquired for one academic year (2 semesters), as shown in Figure 5.
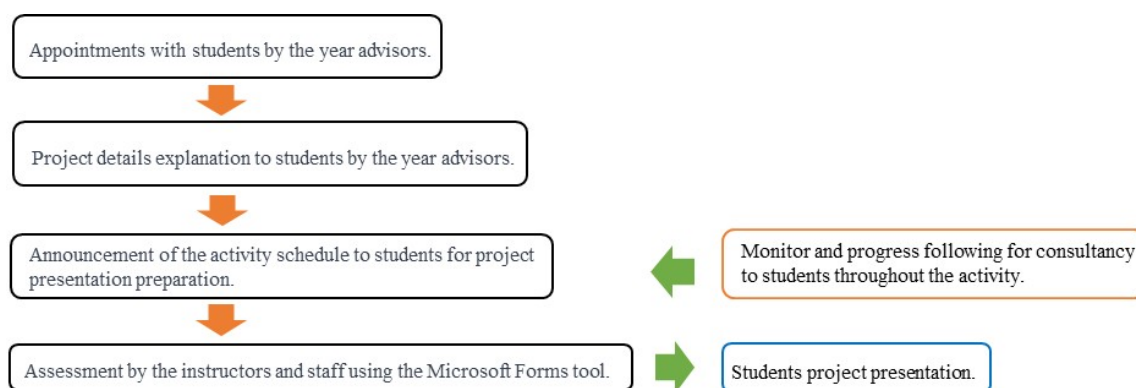
Figure 4: A diagram illustrating the process steps of Yearly Micro-Project activity

Figure 5: The event of Yearly Micro-Project Activity

Assessment of Student Learning Outcomes

In the assessment process of the learning outcomes of the first-year students and the second-year students, the project work was individually shown and presented to the assessors. After that, the assessors gave the score in the Microsoft Form, determined from the qualities of presentation and the work results, according to various aspects as follows:
1. Creativity of the work
2. Skills and abilities in different subjects
   (ex. packaging and printing, science, English language proficiency, etc.)
3. Intellectual aspects (ex. thinking, planning, problem-solving)
4. Responsibility and ethics in the work

The assessors were divided into two groups for two parts of the assessment process through the Microsoft Forms tool. The subject instructors should assess the learning outcome of the students in their course after completing the classes. In addition, the instructors and supporting staff in the program of Packaging and Printing Technology assessed the overall qualities of the students' work. The average total scores calculated from assessment and weighted scores from all parts from all assessors were interpreted to grade level, as Table 6.

Score Range	Interpretation	Grade
3.75 – 4.00	Excellent	A
3.25 – 3.74	Very good	B+
2.75 – 3.24	Good	B
2.25 – 2.74	Fair	C+
2.00 – 2.24	Poor	C
< 2.00	Very poor	I (incomplete)

Table 6: Interpretation of score range into grade

The administrators of this program set out the criteria for the expected score assessed from the students learning outcome as follows:
1. The score range for the excellent and very good is above the criteria as expected.
2. The score range for the good level is the criteria as expected.
3. The score range under the criteria as expected are the fair and poor level which should be concerned for improvement.

More than 80% of the total undergraduate students should be at the level of good, very good and excellent. However, the students with an average score of more than 2 will be considered to have passed the course with the lower grades while the students with an average score less than 2 will not pass and must present again by improving their works within one year later.

Evaluation of Satisfaction

The evaluation of satisfaction towards the activity of Yearly Micro-Project through the Microsoft Forms tool was also performed by all involved students, instructors and supporting staff. The online questionnaire for satisfaction evaluation in 5-level rating scale [5] on the topics in Table 8 was sent to the activity participants after completing the activity. The obtained scores from the respondents were classified and interpreted in the range as shown in Table 7. The opinion expression was also included in the open-ended questionnaire for further consideration of activity process improvement.

Range of Satisfaction	Interpretation
4.51 – 5.00	Very satisfied
3.51 – 4.50	Somewhat satisfied
2.51 – 3.50	Neutral
1.51 – 2.50	Somewhat unsatisfied
1.00 – 1.50	Very unsatisfied

Table 7: The interpretation for satisfaction evaluation results from 5-level rating scale

Evaluation Topics	Sub-topics
Activity Management	- Activity announcement - Notification of information - Duration of the event - Schedule of the event
Activity Format	- Presentation style - Evaluation method
Activity Venue	- Suitability of venue
Obtained Benefit from the Activity (students only)	- Knowledge, ideas, skills, and experiences from this activity - Application to your studies or practical work. - Accordant to your expectations
Overview of Activities	-

Table 8: The contents in questionnaire for satisfaction evaluation

Research Results

The Learning Outcome Assessment of the Students

After the students' learning outcomes of each subject were assessed by the instructors, the number of students in each grade was identified to determine the teaching and learning achievement, as shown in Table 9.

Subjects	Number of students in each grade from CLO								Mean	S.D.
	A	B+	B	C+	C	I	Level as Expected	Pass		
Basic Packaging and Printing	0	11	25	4	3	2	80.00%	95.55%	2.88	0.73
Drawing and Photo for Packaging and Printing	10	11	13	1	1	9	75.55%	80.00%	3.35	0.99
Layout Design	17	7	12	1	0	5	80.00%	82.22%	2.71	1.44
Basic Science for Packaging and Printing	2	0	2	7	8	26	8.88%	42.22%	1.85	0.88
Prepress Process	32	0	2	0	1	10	75.50%	77.78%	3.71	2.05

Table 9: The assessment of year learning outcomes of 45 first year students

Table 9 shows that the subject of Prepress Process had the greatest number of excellent students (71.11%) who got grade A, mean value = 3.71, S.D. = 2.05. The subject of Basic Packaging and Printing had none of excellent students, mean = 2.88, S.D. = 0.73, indicating that the subject instructor should find the tools to improve the learning activity and outcomes. Two subjects were achieving the criteria of student number getting the expected level (80%) and other two subjects almost met the criteria (around 75.5%), while only one subject was not achieved. The subject of Basic Science for Packaging and Printing had the greatest number of students not pass (grade I), indicating that the subject instructors should improve their teaching methods to enhance the learning outcome of many students.

Subjects	Number of students in each grade from CLO								Mean	S.D.
	A	B+	B	C+	C	I	Level as Expected	Pass		
Printing ink	12	0	20	0	13	10	58.18%	81.81%	2.94	1.32
Glass and Metal	12	22	4	0	14	3	69.09%	94.54%	3.22	0.79
Paper and Wood	14	15	16	2	4	4	81.81%	92.73%	3.36	0.61
Offset printing	2	7	41	1	0	4	90.91%	92.73%	3.05	0.51
Packaging Design	14	26	10	1	0	4	90.91%	92.73%	3.48	0.65
Color Management System	9	0	33	0	10	3	76.36%	94.54%	3.02	0.70
Post press process	10	0	22	0	18	5	58.18%	90.91%	2.80	0.78
Digital printing	8	0	8	0	34	5	29.09%	90.91%	2.42	0.80
Screen printing	0	0	41	0	10	4	74.55%	92.73%	2.75	0.56

Table 10: The assessment of year learning outcomes of 55 second year students

Table 10 shows that the subject of Screen Printing had none of excellent students getting grade A, mean = 2.75, S.D. = 0.56. Four subjects had the highest number of excellent

students (22-25%) who got grade A. There were three subjects meeting the criteria of student number getting the expected level (>80%) and two subjects almost meet the criteria (around 74-76%), while 4 subjects were not achieved, which should be found the tools to improve the learning outcomes.

Score Range	Interpretation	Student Number	Ratio (%)
3.75 – 4.00	Excellent	16	35.55
3.25 – 3.74	Very good	15	33.33
2.75 – 3.24	Good	3	6.67
2.25 – 2.74	Fair	4	8.88
2.00 – 2.24	Poor	2	4.44
< 2.00	Very poor	2	4.44
Total		45	

Remark: Mean score = 3.45, S.D. = 0.72

Table 11: The interpretation of the Year Learning Outcomes for
the first-year undergraduate students

Table 11 shows that the overall scores for 68.88% of total students, more than half, were higher than the mean score, indicating that the learning outcome level was higher than the expected level, while 31.11% of total students got a score below the mean value.

Score Range	Interpretation	Student Number	Ratio (%)
3.75 – 4.00	Excellent	19	34.54
3.25 – 3.74	Very good	31	56.36
2.75 – 3.24	Good	1	1.81
2.25 – 2.74	Fair	0	0
2.00 – 2.24	Poor	0	0
< 2.00	Very poor	4	7.27
Total		55	

Remark: Mean score = 3.42, S.D. = 1.00

Table 12: The interpretation of the Year Learning Outcomes
for the second-year undergraduate students

Table 12 shows that the overall scores for 90.9% of total students almost all students were higher than the mean score, indicating that the learning outcome level was very higher than the expected level, while only 7.27% of total students got a score below the mean value. The results indicate that the second-year undergraduate students with more learning experience and KSA increase had more learning outcomes with higher competency than the first-year undergraduate students.

Evaluation of the Participants' Satisfaction on the Activity

The results of the satisfaction opinions for the activities in this session, evaluated by the participated students, instructors, and staffs are shown as Table 13.

Evaluation Topics	Evaluators		
	Students	Instructors	Staffs
Activity Management	4.22	4.67	4.06
Activity Format	4.24	4.67	4.13
Activity Venue	4.36	4.33	4.50
Obtained Benefit from the Activity (students only)	4.44	-	-
Overview of Activities	4.14	4.33	4.25
Mean	4.28	4.50	4.23
S.D.	0.12	0.19	0.19
Level Interpretation	**Good**	**Good**	**Good**

Table 13: The Evaluation of Satisfaction

From Table 13, the satisfaction survey regarding the organizing of this event, the results indicate that all participants, instructors, and supporting staff were satisfied at the good level. The amount of 72% of the total participants agree to set the activity as this event in the next year, while the other participants of 28% disagree to set this activity.

Conclusions

For the learning outcomes assessment of 45 first-year students from 5 subjects, it was found that one subject (Prepress Process) had the greatest number of excellent students while another one subject (Basic Packaging and Printing) had none of excellent students which should be improved by the subject instructor. Almost four subjects were achieved as the criteria of student number getting the expected level (75-80%) of total students) while only one subject was not achieved. One subject (Basic Science for Packaging and Printing) had a high number of students not pass (grade I), indicating that the subject instructors should find the tools for this problem solving.

For the learning outcomes assessment of 55 second-year students from 9 subjects, one subject (Screen Printing) had none of excellent students getting grade A while four subjects had the highest number of excellent students (22-25%). There were three subjects that achieved the expected number of students getting accepted level and two subjects almost met the criteria while four subjects were not acquired, which should be further improved.

For the overall assessment, more than half (69%) of the first-year undergraduate students got higher average scores than the mean score, and almost all the second-year undergraduate students (91%) got higher average scores than the mean score.

From the evaluation of satisfaction on the activity, the participants, instructors, and staff, were satisfied with this activity with the rating scale range at the level of good.

From the opinion expression, 72% of total participants agree to set the activity continuously in the next year while the others of 28% disagree to set this activity.

Issues Encountered

Students should improve their readiness in preparing content for presentation. They should have more self-learning about the topics they have learned and ask for the information from

the instructors. Additionally, the project work should be continuously updated on the progress by prior present to their year advisors.

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ChatGPT Technology and Its Role in Promoting Creativity in Education

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Abstract

This study aims to achieve several main objectives. First, it aims to analyze the role of ChatGPT technology in promoting creative interaction between teachers and students in the context of education. Second, seeks to study the impact of ChatGPT technology on the development of students' creative skills, such as critical thinking, creative design, and innovation. Third, aims to explore the possibility of expanding the boundaries of creativity in education using ChatGPT technology. Finally, aims to identify potential future applications of ChatGPT technology in promoting creativity in education. The descriptive analytical approach was used, and the study tool was a questionnaire to identify the technology and its role in promoting creativity in education, and the research sample consisted of (92) university professors in the United Arab Emirates, and they were randomly selected. The results proved that there are statistically significant differences between university professors in the United Arab Emirates towards ChatGPT technology and its role in promoting creativity in education, which indicates its great role in promoting creativity in education.

Keywords: Chatgpt Technology, Creativity, Education, Creative Interaction, Critical Thinking, Creative Design, Innovation

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Introduction

In December 2022, the field of artificial intelligence, particularly the area of chatbot development and utilization, experienced a surge in growth with the launch of the ChatGPT chatbot. However, ChatGPT is not a new concept, as they have been in existence for almost six decades. The first chatbot, called ELIZA, developed by Weizenbaum in 1966, utilized pattern matching to simulate psychotherapist conversation with human patients. While ELIZA may be unfamiliar to the general public, many individuals are familiar with more modern virtual chatbot assistants, such as Amazon's Alexa and Apple's Siri, which operate on logical and virtual chatbot systems. The fundamental goal and premise of so-called chat-bots is that a computer converses with human clients in natural language in a manner that is as human-like as feasible (Bradeško & Mladenić, 2012). They are computer programs that mimic and process human communication, allowing people to interact with digital devices as if they were speaking with another person (Ciechanowski et al., 2019).

With the rapid advancement of technology, education is undergoing a remarkable shift in terms of tools and techniques used in the classroom. Among these innovative technologies, ChatGPT stands out as one of the most promising tools that contribute to enhancing creativity in the learning process.

ChatGPT technology is an AI-based system that can be used to create intelligent and advanced conversations between students and teachers. This technology is based on text analysis and automatic response, providing exciting opportunities for innovation and interactive learning. One of the notable features of ChatGPT technology is its ability to foster creative interaction between teachers and students. Through the ability to communicate and discuss in a direct and effective way, students can interact with educational content, ask questions, and express their ideas freely. This allows teachers to provide appropriate guidance and assistance and promote active learning and innovation.

In addition, ChatGPT technology contributes to the development of students' creative skills. Encourages conversational discussions and collaborative problem solving and promotes critical thinking and creative design. These skills allow students to tap into their creative potential and develop their abilities to find new and innovative solutions to complex problems. It is also important to note that creativity in education can be expanded using ChatGPT technology. In addition to creative interaction within the classroom, this technology can enhance communication and shared learning between students and teachers across time and space. Students can participate in online collaborative discussions and projects, allowing them to benefit from multiple experiences and opinions and foster the exchange of creative ideas.

ChatGPT are increasingly being used in education. Clarizia et al. (2018) introduced it as a useful technology for supporting education, as they enable one of the most important ways to promote and enable personalized learning, not only increasing support and inclusion of students but also significantly reducing the administrative workload of teachers and enabling them to focus more on curriculum development and research (Cunningham-Nelson et al., 2019). Their advantage is that they are an interactive mechanism compared to traditional e-learning systems (Kowalski et at., 2011), and their users are only limited by the creativity and imagination of the user (Roos, 2018). In 2021, Okonkwo and Ade-Ibijola presented a study in which they analyzed 53 articles from reputable digital databases, with the aim of understanding the use of ChatGPT in education, including basic information, benefits,

challenges, and suggestions for future research on the use of ChatGPT in education. Their study found that chatbot technology is used in various areas of education, including teaching and learning (66 %), administration (5 %), assessment (6 %), advisory (4 %), and research and development (19%). They highlight that the introduction of chatbot systems in education can bring personalized online learning and greater accessibility to learning materials, which students can access from anywhere and at any time. Lin and Chang (2020) and Murad et al. (2019) added that ChatGPT are good technological innovations that improve students' interest in learning, cognitive skills acquisition, and academic achievements. They also have a successful impact on students' motivation.

Recently, there has been increasing global interest in the importance and contribution of creativity in the learning process; to form the student's personality, form his identity, build his independence, direct his attention through experimentation, ask questions, identify, and solve the problem using mental imagination and creative self-expression, and find innovative alternatives by generating new ideas.

The use of ChatGPT in educational environments requires special skills from teachers. Most existing research on the use of ChatGPT focuses on the opportunities they offer teachers and other educators to assess curriculum goals. However, it is difficult to find research that explores ChatGPT Technology and its Role in Promoting Creativity in Education.

The number of studies exploring the use of chatbots in education is increasing (e.g., Kuhail et al., 2023; Yildiz Durak, 2023; Hew et al., 2023), The main objective of the current research is to identify the ChatGPT technology and its role in promoting creativity in education through: Building a questionnaire on ChatGPT technology and its role in promoting creativity in education and calculating its honesty and stability, Revealing the reality of the application of ChatGPT technology and its role in promoting creativity in education, Reaching recommendations and suggestions on ChatGPT technology and its role in promoting creativity in education.

Large language models are a form of generative AI that pro-dux human-like language (OpenAI, 2023a). OpenAI trains its text-generating models using machine learning algorithms on large amounts of text, including books, news articles, websites, and Wikipedia (Scharth, 2022). By processing terabytes of data, models acquire the patterns and structure of language, enabling them to provide users with relevant and meaningful content in response to their requests. When I asked ChatGPT to describe itself (prompt-Describe ChatGPT), it generated the following italicised text: ChatGPT is a language model developed by OpenAI. It is a variant of the ChatGPT (Generative Pre-training Transformer) model, which is trained on a massive amount of text data to generate human-like text. It can be used for a variety of natural language processing tasks, such as language translation, text summarization, question answering, and for chatbot applications. It can understand and respond to human inputs in a conversational way, making it well suited for interactive applications. ChatGPT can be fne-tuned on specific data sets and task, which means it can be customized to perform specific task and generate outputs that are more accurate and useful. ChatGPT can... "write stories, give life advice, even compose poems and code computer programs" (Scharth,2022, para. 2). There have been reports however that it... "produces fake citations and reproduces biases that exist in the literature" (Gleason, 2022, para. 7). According to cited ChatGPT output, "AI systems can perpetuate biases that are present in the data they are trained on. This can lead to unequal and unfair outcomes for students, particularly if the bias is related to factors such as race, gender, or socio-economic status" (Zhai, 2022, p. 7). OpenAI (2023) acknowledge in

their advice to educators that... "ChatGPT may produce content that perpetuates harmful biases and stereotypes, sometimes in subtle ways... the model is generally skewed towards content that reflects Western perspectives and people" (para. 18). ChatGPT has gone viral on social media, and anecdotal- tal evidence suggests that students are already familiar with it. It is safe to assume that undergraduate students are using ChatGPT or a similar software. Given ChatGPT's apparent usage and stakeholder concerns, it is crucial to evaluate its output about Promoting Creativity in Education. As far as I am aware, there has been no prior research that has examined the text generated by ChatGPT in relation to its Role in Promoting Creativity in Education. Also, there is little written about its utilisation as a research tool, Promoting Creativity in Education.

Chat GPT, a recent AI innovation by Open AI that quickly gained million users (Haque, et al, 2022) holds the potential for improving self-directed learning. Examining Chat GPT's ability to aid autodidactic. Learning is important for understanding how to best utilize chatbots and AI in education, and for guiding the future of education and technology-assisted learning. By understanding how ChatGPT can support independent study, educators and students can use these technologies to enhance their own learning and development. Additionally, this research can inform policy decisions on incorporating these technologies into educational settings.

The researcher sees Creativity and innovation are necessities, important elements, and basic features that should be available in the teacher, in the modern school principal and in the learner, as a result of the increasing ambitions, the multiplicity of needs, and their diversity, and the phenomenon of the knowledge age and the challenges it imposes in all aspects and fields of life are an essential point in the need to adopt creativity and innovation in the management of the educational process, and the leadership of the school of the era.

The researcher sees ChatGPT It is a powerful language model that relies on artificial intelligence to answer user questions creatively and write articles without quoting from another source. It can be used in different ways to enhance the learning experience and improve education Some of its benefits are providing a rich source of knowledge, reducing the cost of educational resources, access to knowledge to any student from anywhere and at any time, developing new teaching mechanisms that are more interactive, Contribute to the development of curricula and office tasks, Motivate students to think critically and creatively.

Research Focus

The aim of this study was to explore the ChatGPT Technology and its Role in Promoting Creativity in Education.

Research Tools, Procedures, and Results

This part describes the method and procedures of the field side of the current research, including the research methodology, the research community and its sample, the research tool, its validity and stability, the procedures followed by the researcher in the application process, in addition to the statistical methods and treatments used in data analysis.

First: Research Tools and Procedures

Research Methodology

The research used the descriptive analytical approach, due to its suitability for the purposes of the study, and the researcher prepared a questionnaire to identify the ChatGPT technology and its role in promoting creativity in education.

Research Community

The research community consisted of all university professors in the United Arab Emirates, whose number is (108).

Exploratory Research Sample

Where the survey sample consisted of (50) university professors in the United Arab Emirates.

Basic Research Sample

The current research sample consisted of (92) university professors in the United Arab Emirates, and they were selected randomly, and Table No. (1) shows the distribution of the study sample according to its variables.

Table 1: Distribution of Study Sample by Type

Variable	Groups	as	%
gender	males	46	50%
	females	46	50%
Chronological age	Less than 50 years old	46	50%
	More than 50 years	46	50%
Degree	Lecturer	15	15%
	Assistant Professor	17	35%
	Professor doctor	60	50%
Total		92	100%

It is clear from Table (1) that the study sample (46) of male professors by (50%) while females recorded (46) by (50%) and that the percentage of females is less than the percentage of males.

Research Objectives

The main objective of the current research is to identify ChatGPT technology and its role in promoting creativity in education through:
1. Building a questionnaire on ChatGPT technology and its role in promoting creativity in education and calculating its honesty and stability.
2. Revealing the reality of the application of ChatGPT technology and its role in promoting creativity in education.
3. Reaching recommendations and suggestions on ChatGPT technology and its role in promoting creativity in education.

Research Tool: Identify the Technology of Chat ChatGPT and Its Role in Promoting Creativity in Education

To achieve the goal of the research, the researcher prepared a questionnaire after reviewing the theoretical literature on the field of research and previous studies, because the questionnaire is one of the common tools in educational research, where researchers use it to obtain the reality of the already existing situation and conduct research related to trends and opinions.

The justifications for choosing the questionnaire tool are as follows:
- Suitability for the nature of the current research
- The possibility of distributing it to large numbers of examined people who live in distant geographical areas
- Easy to distribute, manage and analyze results
- Saving a lot of expenses and effort on the researcher

The researcher has developed the research tool, which is a questionnaire covering fifteen phrases (Appendix No. 1), about the technology of chat ChatGPT and its role in promoting creativity in education, where he developed it to collect information, according to the following steps:
1- Access to educational literature and previous studies related to the subject of study.
2- Using some previous questionnaire models.
3- Choose appropriate items and exclude others to avoid prolongation or repetition.
4- Modifying some items to suit ChatGPT technology and its role in promoting creativity in education.

The Tool Consisted of Two Parts

The first section: It consists of three variables, including gender, function, and the dependent variable is ChatGPT technology and its role in promoting creativity in education.

The second section: included (15) phrases that include ChatGPT technology and its role in promoting creativity in education.

The research relied on a quintuple gradient according to the Likert method as follows: the degree of "strongly agree" and represents (5) agree and represents (4) two degrees, neutral (3), disagree (2), strongly disagree (1).

First: The Authenticity of the ChatGPT Technology Questionnaire and Its Role in Promoting Creativity in Education

Apparent Honesty

Where the questionnaire was designed in a way that ensures apparent honesty through clarification of the questionnaire instructions and the formulation of questionnaire questions in an easy manner and clear words that do not bear more than one meaning, and one phrase includes one idea, and the answer to the questionnaire phrases does not take a long time and great effort, and the sincerity of the questionnaire was verified by presenting it to a group of specialized arbitrators with experience in the field and their number (7) specialists from the faculty members in the faculties of education, In order to verify the clarity of the phrases and

the affiliation of each of them to the axis that followed and the extent to which the axes of the questionnaire cover the goal of it, the researcher has committed to making amendments and observations made by the arbitrators.

Sincerity of Internal Consistency

The sincerity of internal consistency means "the extent to which the scores of each of the phrases correlate with the total score of the questionnaire (Salah El-Din Mahmoud Allam, 1993, p. 215).

The researcher calculated the correlation coefficient between the degree of each statement and the total degree of the resolution, and the following tables (2) show the validity of the axes of the resolution.

Table 2: Correlation coefficients between the score of each statement and the total degree of the resolution

M	Correlation coefficient	M	Correlation coefficient	M	Correlation coefficient
1	0.805**	6	0.936**	11	0.795**
2	0.917**	7	0.833**	12	0.844**
3	0.879**	8	0.950**	13	0.869**
4	0.858**	9	0.928**	14	0.783**
5	0.869**	10	0.812**	15	0.812**

**Function at 0.01 level

It is clear from Table (2) that all correlation coefficients between each phrase with the total degree of the resolution are a function at the level of 0.01, which means that the resolution has a high degree of internal consistency, which means that the phrases share the measurement of ChatGPT technology and its role in promoting creativity in education.

Resolution Stability

The stability was calculated using the Alpha Cronbach method of resolution and Getman of half segmentation, and the following table shows the stability coefficients of the resolution.

Table 3: Showing the stability coefficients of the resolution

N	Questionnaire	Number of ferries	Alpha stability coefficient	Getman stability coefficient
1	ChatGPT technology and its role in promoting creativity in education	15	0.957	0.969

From the previous table, it is clear that the stability coefficients (0.957 – 0.969) are high for the resolution as a whole, which indicates confidence in the results of the questionnaire.

In light of the above various mechanisms for legalizing the research tool and reassuring its suitability for use, a codified picture of the questionnaire was finally reached, which was presented to the research sample.

Second: Procedures for Applying the Research Tool

After ensuring the sincerity and stability of the research tool, the researcher took several procedures so that he could apply the questionnaire, which were:
- Preparing the study tool in its final form after ensuring its truthfulness and stability.
- Identify the members of the study sample.
- Distributing the questionnaire to the target group, then collecting it.
- Conduct appropriate statistical analysis and come up with and comment on the results.
- Prepare appropriate recommendations and proposals in light of these results.

Third: Statistical Methods Used

The computer was used to enter the study data by the statistical program known as (SPSS-V.17) any (Statistical Package for Social Science), and in order to analyze the study data, a set of statistical methods were used that are consistent with the objectives of the study, and its methodology, namely:

1- Frequencies, and percentages for each of the questionnaire phrases, in order to identify the opinions (responses) of the study sample members towards the degree of approval of the ChatGPT technology and its role in promoting creativity in education, and to identify the various reasons that justify the respondents' answers and provide a more detailed description of these criteria.

2- **The relative** weight of the responses of the sample members to the questionnaire statements, which is given by the following equation:

$$\text{Relative weight} = \frac{5 \times \text{strongly agree repetition} + 4 \times \text{repeat ok} + 3 \times \text{neutral repetition} + 2 \times \text{repeat disagree} + 1 \times \text{iterations strongly disagree}}{\text{Total duplicates}}$$

3- Calculation (Ka2) to find out the statistical significance of the questionnaire statements for all members of the study sample, i.e., to verify the existence of significant differences in the responses of the study sample members on the degree of approval for each of the questionnaire statements, and the extent of the essence of these differences.

4- Correlation coefficients (Pearson's correlation coefficient) to verify the validity of internal consistency for the resolution.

5- Alpha Cronbach α coefficient to determine the degree of stability of the resolution.

Table 4: For the purposes of statistical analysis of the results,
the following criterion has been adopted

description	Range of averages	Relative weight
Strongly agree	From 4.2- 5	84 – 100%
agree	From 3.40- 4.19	68 – 83.8%
neutral	From 2.60- 3.39	52 -67.8%
Disagree	From 1.80- 2.59	36- 51.8%
Strongly disagree	From 1- 1.79	20- 35.8%

Fourth: The Results of the Study

The study aimed to study the identification of " ChatGPT technology and its role in promoting creativity in education". To achieve the objective of the study, a questionnaire was prepared and verified its truthfulness, and its stability coefficient, and after the data collection process, it was coded and entered into the computer and processed statistically using the statistical package program (SPSS) for the social sciences, and the following are the results of the study according to the sequence of his questions and hypotheses.

The results related to (the reality of the application of ChatGPT technology and its role in promoting creativity in education): Which relates to the following question:

> **"What is the reality of the application of** ChatGPT **technology and its role in promoting creativity in education?"**

To answer the previous question, the arithmetic averages, standard deviations, and percentages of the phrases of the ChatGPT technology questionnaire and its role in enhancing creativity in education were extracted, and the study adopted the five-point Likert scale to estimate the degree of achievement of the reality of the application of ChatGPT technology and its role in promoting creativity in education, and the results table (5) shows as follows:

Table 5: Mean, relative weight, and the value of Ka2 and its level of significance for the reality statements of ChatGPT technology and its role in promoting creativity in education

N	Phrases		Strongly agree	Agree	Neutral	Reject	Strongly reject	Average	Relative Weight %	Standard deviation	Order	Ka2
1	ChatGPT technology contributes to creative interaction between teachers and students?	Duplicate	34	58	0	0	0	4.36	87.2	0.48	7	6.26*
		%	37	63	0	0	0					
2	Have you noticed an improvement in students' creative skills thanks to the use of ChatGPT technology?	Duplicate	35	55	2	0	0	4.35	87	0.52	11	46.71*
		%	38	59.8	2.2	0	0					
3	Using ChatGPT technology is an effective way to develop students' critical thinking?	Duplicate	36	54	2	0	0	4.36	87.2	0.53	8	45.47*
		%	39.1	58.7	2.2	0	0					

N	Phrases		Strongly agree	Agree	Neutral	Reject	Strongly reject	Average	Relative Weight %	Standard deviation	Order	Ka2
4	ChatGPT technology promotes creative design and innovation in the context of education?	Duplicate	37	53	2	0	0	4.38	87.6	0.53	4	44.37*
		%	40.2	57.6	2.2	0	0					
5	ChatGPT technology promotes creative design and innovation in the context of education?	Duplicate	39	51	2	0	0	4.40	88	0.53	1	42.54*
		%	42.4	55.4	2.2	0	0					
6	Using ChatGPT technology enhances collaboration and interaction among students?	Duplicate	37	52	2	1	0	4.35	87	0.58	12	85.30*
		%	40.2	56.5	2.2	1.1	0					
7	ChatGPT technology offers potential benefits for boosting creativity in education?	Duplicate	35	55	2	0	0	4.36	87.2	0.52	9	46.71*
		%	38	59.8	2.2	0	0					
8	Would you recommend using ChatGPT technology to foster creativity in the context of education?	Duplicate	35	54	3	0	0	4.36	87.2	0.54	10	43.32*
		%	38	58.7	3.3	0	0					
9	ChatGPT technology enhances social interaction and communication between students, teachers, and parents?	Duplicate	38	52	2	0	0	4.39	87.8	0.53	2	43.39*
		%	41.3	56.5	2.2	0	0					

N	Phrases		Strongly agree	Agree	Neutral	Reject	Strongly reject	Average	Relative Weight %	Standard deviation	Order	Ka2
10	ChatGPT technology provides a comprehensive and integrated learning experience that suits the needs of each individual student?	Duplicate	34	57	1	0	0	4.38	87.6	0.50	5	51.57*
		%	37	62	1.1	0	0					
11	you believe that ChatGPT technology improves students' literacy and critical thinking skills.	Duplicate	38	52	2	0	0	4.39	87.8	0.53	3	43.39*
		%	41.3	56.5	2.2	0	0					
12	ChatGPT technology develops skills to learn new languages and improve communication between different cultures?	Duplicate	36	52	4	0	0	4.33	86.6	0.56	13	38.95*
		%	39.1	56.5	4.3	0	0					
13	ChatGPT technology can be used as an interactive source of e-learning by interacting and adapting to educational content?	Duplicate	38	52	1	1	0	4.37	87.4	0.57	6	88.43*
		%	41.3	56.5	1.1	1.1	0					
14	ChatGPT technology is a powerful tool to help users solve problems and provide perfect solutions quickly and accurately.	Duplicate	32	59	1	0	0	4.32	86.4	0.49	14	54.93*
		%	34.8	64.1	1.1	0	0					

N	Phrases		Strongly agree	Agree	Neutral	Reject	Strongly reject	Average	Relative Weight %	Standard deviation	Order	Ka2
15	ChatGPT technology provides a more effective and easy way to talk across the board, along with providing resources to improve language performance in general.	Duplicate	33	56	2	1	0	4.31	86.2	0.57	15	91.91*
		%	35.9	60.9	2.2	1.1	0					

**Function at 0.01, *Function at 0.05

By extrapolating the results of the previous table, it was found that:

By reviewing the table (5) on "**The reality** of the application of ChatGPT technology and its role in promoting creativity in education", it is clear that:

* The average relative importance of the questionnaire phrases "the reality of ChatGPT technology and its role in promoting creativity in education" = 4.36 with a relative weight (87.2%), which represents a degree of strong approval, meaning that ChatGPT technology has a major role in promoting creativity in education.

* Approval rate for all questionnaire statements strongly agreed: It received strong approval and percentages ranging between (86.2-88 %), the highest of which was statement No. (5) "**I noticed an expansion in the limits of creativity in learning thanks to the use of ChatGPT technology**." by 88%.

* As for the relative importance of the **questionnaire** phrases "The reality of ChatGPT technology and its role in promoting creativity in education", which is reflected in the relative weight of each phrase, by reviewing the previous table No. (5) it is clear that:

Statement No. (5) "I noticed an expansion in the limits of creativity in learning thanks to the use of ChatGPT technology" came in the first place, followed by statement No. (9) **"ChatGPT technology enhances social interaction and communication between students, teachers and parents"** in second place, and statement No. (11) "You see that **ChatGPT** technology Improves students' reading, writing and critical thinking skills" in third place, and in the last place came statement No. (15) "ChatGPT technology provides a more effective and easy way to talk in all areas, in addition to providing resources to improve language performance in general", preceded by phrase number (14) which states "ChatGPT technology is a powerful tool to help users solve problems and provide ideal solutions quickly and accurately".

* With regard to statistical significance, it is noted that:

By reviewing Table No. (5) it is clear from the value of Ka2that all the statements of the questionnaire are statistically significant at the level of (**0.01) and in favor of approval,** that is, there are statistically significant differences between university professors in the United

Arab Emirates towards ChatGPT technology and its role in promoting creativity in education, which indicates its great role in promoting creativity in education , which is consistent with the theoretical framework of the study as well as the results of previous studies in emphasizing the importance of ChatGPT technology and its role in promoting creativity in education.

Discussion

By Discussing the findings, it becomes clear that:
- ChatGPT technology has a major role in promoting creativity in education.
- ChatGPT technology has expanded the development of creativity in education.
- ChatGPT technology enhances social interaction and communication between students, teachers, and parents.
- ChatGPT technology Improves students' reading, writing and critical thinking skills.
- ChatGPT technology promotes creative design and innovation in the context of education.
- ChatGPT technology provides a comprehensive and integrated learning experience that suits the needs of each individual student.
- ChatGPT technology can be used as an interactive source of e-learning by interacting and adapting to educational content.
- ChatGPT technology contributes to creative interaction between teachers and students**.**

These results are consistent with a study (off the school, 2023) on the importance of artificial intelligence in promoting creativity in education. Where the previous study confirmed that the technology has the potential to both limit and augment our creative capabilities. It is up to us, as teachers and educators, to guide the future of this relationship and ensure that it supports the continued growth and development of human creativity. By approaching AI as a tool to be used in the service of human creativity, rather than a threat to it, we can help to ensure a bright future for both the technology and the humans who use it.

Conclusion and Recommendations

From the results of the current research, it is necessary to develop ChatGPT so that it is able to provide unique educational experiences for each student based on their personal needs and interests, create new and innovative educational content, such as explanatory texts and questions to test concepts, and in order to support students in developing creative solutions to problems by providing suggestions and guidance, to encourage students to think critically and devise alternative and non-traditional solutions to educational challenges. , to help enhance interaction between students and increase their engagement by chatting with technology to ask questions and discuss, Provide support to students during distance learning and motivate them to explore topics autonomously, In creating interactive conversations, Create exciting dialogues and conversations with fictional or historical figures to enhance students' understanding of educational materials, Help teachers and students develop interesting and engaging educational stories and scenarios , Supporting classroom discussions by providing multiple perspectives and adding new ideas to stimulate thinking and discussion, creating innovative interactive experiences such as educational games and educational simulations that help stimulate thinking and learning to illustrate difficult concepts in a simple way, Providing customized support for students with special needs, helping them access educational content in ways that suit their needs, using it. To facilitate collaborative learning

and teamwork by fostering interaction and exchange of ideas among students, you must turn into AI mentors who guide students through their learning stages and provide them with personalized advice. Use them to develop innovative interactive lessons that allow students to interact with educational content and conduct effective experiences, so that they can provide practice and training in learning foreign languages through conversations and language exchanges with the model.

Appendix No. (1)

ChatGPT technology and its role in promoting creativity in education.

N	Phrase	Strongly agree. 5	Agree 4	Neutral 3	Reject 2	strongly reject. 1
1	ChatGPT technology contributes to creative interaction between teachers and students					
2	Have you noticed an improvement in students' creative skills thanks to the use of ChatGPT technology					
3	Using ChatGPT technology is an effective way to develop students' critical thinking					
4	ChatGPT technology promotes creative design and innovation in the context of education					
5	Have you noticed an expansion of creativity in learning thanks to the use of ChatGPT technology					
6	Using ChatGPT technology enhances collaboration and interaction among students					
7	ChatGPT technology offers potential benefits for boosting					

	creativity in education					
8	Would you recommend using ChatGPT technology to foster creativity in the context of education					
9	ChatGPT technology enhances social interaction and communication between students, teachers, and parents					
10	ChatGPT technology provides a comprehensive and integrated learning experience that suits the needs of each individual student					
11	She believes that ChatGPT technology improves students' literacy and critical thinking skills.					
12	ChatGPT technology develops skills to learn new languages and improve communication between different cultures					
13	ChatGPT technology can be used as an interactive source of e-learning by interacting and adapting to					

	educational content					
14	ChatGPT technology is a powerful tool to help users solve problems and provide perfect solutions quickly and accurately.					
15	ChatGPT technology provides a more effective and easy way to talk across the board, along with providing resources to improve language performance in general.					

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Strengthening Characteristics of Outstanding Community Business in Sakon Nakhon Province, Northeastern Thailand – A Case Study on Ban Don Koi Weaving Group in Sakon Nakhon Province

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Abstract

Over decades, Thai government has been supporting and empowering people in local areas to organize community business groups and creating unique local-based products. However, many groups have been still unsuccessful. To encourage those unsuccessful business groups to become more strength, study on operations of successful business groups is vital. An indigo dyed fabric is a traditional wisdom passed on from ancestors and spread widely especially in Northeastern part of Thailand. Therefore, this study aims to indicate strengthening characteristics of outstanding community business. This study employed both quantitative and qualitative research techniques to collect the data on Ban Don Koi Weaving Group. The group leader was purposively interviewed as recommended by the community development officer as an excellent community business group in Sakhon Nakhon Province which was Ban Don Koi Weaving Group. Descriptive statistics was used to explain general information and strengthening characteristics of the group. The results displayed that the indigo dyed fabric group had established since 2003. There were 63 members in the group. There were totally 7 types of group products. The group earned 5 stars of OTOP award. The strengthening characteristics of the group in terms of producing, marketing, administrating, and financing were clear clarified. The government had been supporting the group some budgets, materials and knowledge since establishment. The results indicated that well planning process before producing, marketing, administrating, and financing activities were crucial and the group personnel working with systematic tasks and their discipline continuously were clearly strengthening characteristics of the group.

Keywords: Community Business, Indigo Dyed Fabric, Strengthening Characteristics, Northeastern Thailand

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Introduction

Over decades, Thai government has been supporting and empowering people in local areas to organize community business groups and creating unique local-based products (Khanson, Sreshthaputra, Limnirunkul & Na, 2015). As they will obtain the first supportive priority from government or other sectors. Although the government has attempted to promote the community business groups for several years, there are many groups have been still unsuccessful and failed in the end (Vianmana, Yasunobu & Elias 2016). As the study of Sakolnakorn & Naipinit (2013), they presented that the main problems caused unsuccessful condition in community businesses are composed of marketing, finance and accounting, production, management information systems, product design, and the cost of production. Likewise, Khanson, Sreshthaputra, Limnirunkul, & Na, (2015) revealed about strategies and actions related to develop community business group (silk weaving activity), which are standard production, marketing support and new information, a clear accounting system, product design, social networks, traditional weaving knowledge transfer, and practical and skillful training for members. As the previous studies, the problems related to community businesses' operations have still problematics. Furthermore, Vianmana & Makoto (2021) mentioned that the number of group members, amount of receipts, the number of group product types, and production or non–production of several group product types, influenced the number and percentage of committee members in charge of several types of functions. This issue relates to the process to operate the community business group. Thus, to encourage those unsuccessful community business groups to become more strength and study on operation in terms of successfulness in the kind of the group are necessary.

Objective

1) To indicate strengthening characteristics of outstanding community business.

Methodology

Selected Study Area

The area is located in Sakon Nakhon province, northeastern part of Thailand. Sakon Nakhon is one of Thailand's seventy-six provinces lies in upper northeastern Thailand also called Isan. Neighboring provinces are (from north clockwise) Nong Khai, Bueng Kan, Nakhon Phanom, Mukdahan, Kalasin, and Udon Thani. The capital is Sakon Nakhon. The total area is 9,580 km^2 (3,700 sq mi) with 1,153,390 inhabitants. The province is divided into 18 districts. The districts are further divided into 125 subdistricts and 1,323 villages (Wikipedia, 2023).

The statistic information from community development department (2022), in Sakon Nakhon, indigo-dyed fabric is the 3rd ranking, out of five GI products (GI stands for Geographical Indication). Indigo-dyed fabric products generated approximately 19,946,534.80 USD;1 USD = 32.15 THB in 2021 (Bank of Thailand, 2021).

Sakon Nakhon province

Figure 1: Sakon Nakhon province, Thailand

Table 1: Sales of OTOP products during 4 years (2018-2021)

No.	OTOP products	2018	2019	2020	2021
1	Fattening beef (Pon Yang Karm)	770,244,780	713,489,800	539,226,133	761,323,000
2	UHT/Pasteurized milk	570,551,689	1,089,209,756	1,022,271,215	1,165,957,994
3	Indigo-dyed fabric	342,331,013	667,266,012	613,034,902	641,281,095
4	Mao juice	55,220,675	114,830,832	104,787,013	177,087,092
5	Hang rice	40,110,337	63,918,768	63,374,500	78,152,720

Source: Community development department (2022)

General information of Ban Don Koi Weaving Group

Ban Don Koi Weaving Group is a community business which produces indigo dyed fabric products. The group has been started by Mrs. Pim Srikulkij. There has improved local wisdom about textile weaving and passed on to descendants. Then the group was formed to support each other since September 3rd, 2003 and received knowledge support and budget support from local government organization and governor.

The location of this group is house no. 58, moo. 2, Sawang sub-district, Pan Na Ni Khom district, Sakon Nakhon province 47130, Thailand. The group leader is Mrs. Ta-win Oop-pree

(being the group leader since group establishment in 2003). Telephone number is +66 (0) 87-091-2190. The group sell products at the group shop and only platform such as Facebook and LINE applications. The group has registered OTOP in 2004.

About the group products are unique with shiny and beautiful indigo-dyeing fabric colors. The fabric has long-lasting dye color, unique fragrance, also outstanding with beautiful antique and applied patterns. As the group's products which is called "mudmee" is tied/dyed process", has obtained a 5-star OTOP product in 2019 until the present which is the highest ranking of the awards.

Figure 2: The place of Ban Don Koi Weaving Group

Group Structure

As Vianmana and Nohmi (2020), they revealed that the groups are composed of group committee members and general group members. Group committee members consist of executive and general committee members. The group structure consists of a leader, vice-leader(s), secretary(ies), treasurer(s), consultant(s), and general committee member(s) who have specific duties. The majority of the groups have fewer than 15 group committee members.

The group leader is responsible for the overall group activities, and he/she directs and supports the group members. He/she also facilitates coordination between the external players (government organizations, other supporters, or customers) and group members. The vice-leader assists the group leader in managing the group operations and is the key person that contacts government organizations or other supporters. The secretary records the information collected from group meetings or other events. The treasurer manages the group's finances.
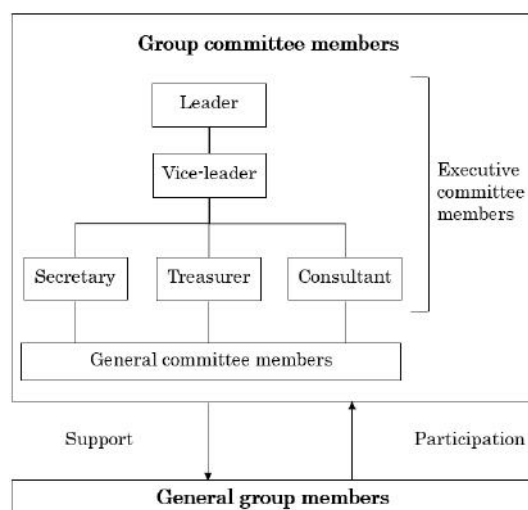
Figure 3: Group structure of community business (Vianmana and Nohmi, 2020)

This study employed both quantitative and qualitative research techniques to collect the data on Ban Don Koi Weaving Group. The group leader was purposively interviewed as recommended by the community development officer as an outstanding community business group in Sakhon Nakhon province which was Ban Don Koi Weaving Group. Descriptive statistics was used to explain general information and strengthening characteristics of the group. Thus, we study about indigo dyed business group which is a traditional wisdom passed on from ancestors and spread widely especially in Northeastern part of Thailand. Furthermore, this group is an outstanding group in Sakon Nakhon Province suggested by the community development department.

Results

General Information

The results displayed that there were 63 group members in 2023. The group had established since 2003 with 9 group members. The group composted of 17 committee members. There were totally 7 types of group products which were handkerchief, scarf, shawl, a set of fabrics, multi-purpose fabric, ready to wear clothes, and bags (pre- order). The group earned 5 stars of OTOP award which is the highest ranking of the awards and rewarded an industry production standard to guarantee that the product has high quality.

Figure 4: Group structure of Ban Don Koi Weaving Group

Production Planning

Inside the group building, there are 34 handlooms to weave fabrics. Based on seven types of the group's products, a set of fabrics was the bestseller. This set is included by two fabrics in order to make cloth and skirt or trousers. The price per set is around 1,800 -2,600 THB; 1USD = 34.96 THB in 2023, (Bank of Thailand, 2023). The group also produce the products regarding to orders from customers.

About production capacity and its value, the group could produce a set of fabrics about 2,200 sets per month and its value was 840,400 THB, which were the highest number of production capacity and its value compared to other product types. Therefore, the capability to produce high quality products and production capacity are important.
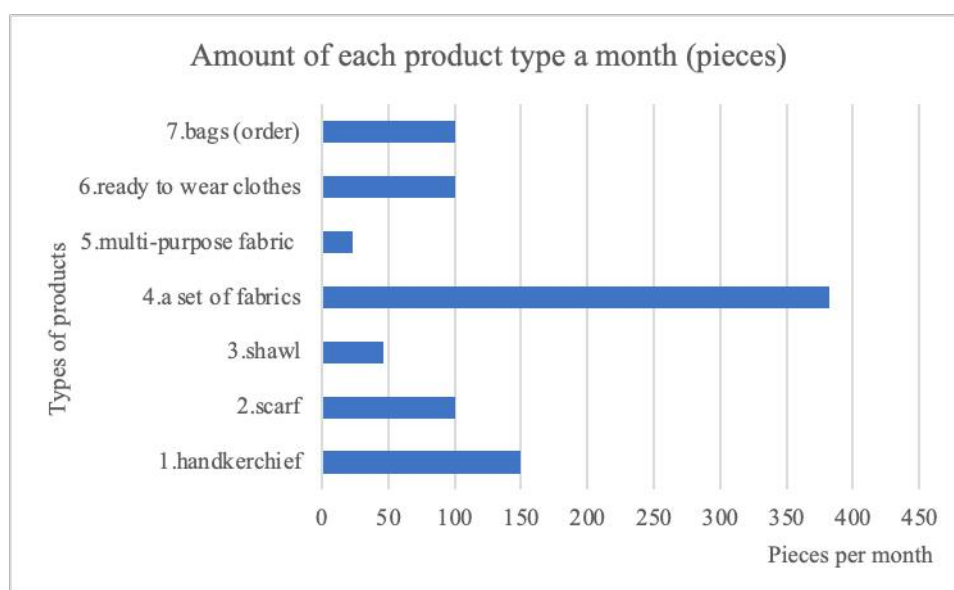
Figure 5: Amount of each product type a month
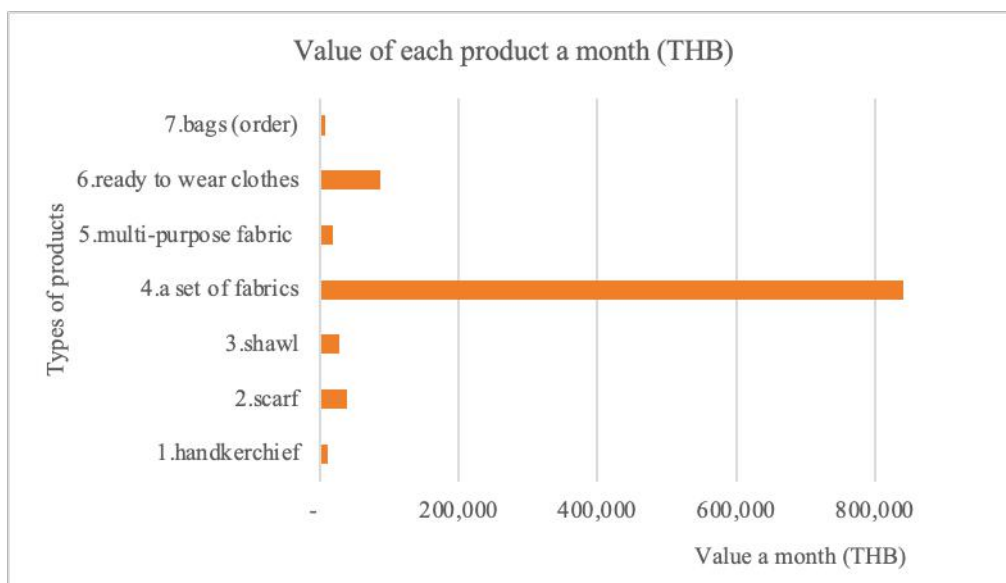
Figure 6: Value of each product a month

Figure 7: Handlooms

Marketing Planning

The group ordered cotton threads from Bangkok 300-400 Kg. per month (200 THB/ kg.) to produce all group product types. Threads were tied/dyed in indigo colors and dried.

First stage was started by supplying thread from shop in order to produce primary stage by the group members. After that, middleman inside Sakon Nakhon province will come to take the group products at the group place or the group deliver the products to customers using online and transportation service in the country and overseas. Thus, pre-order, market channels, and a credit to finish work intime are important things to strengthen the group.

Figure 8: Indigo color

Figure 9: Drying cotton threads after indigo dyed process

❖ The group
(members)
❖ Thread shop in
Bangkok

❖ Middleman in the
province
❖ Online
❖ Delivery

❖ Middleman
(overseas)
❖ Online
❖ Delivery
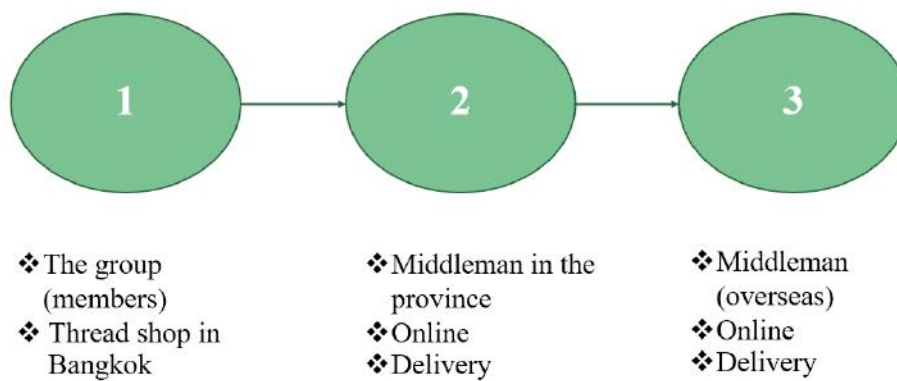
Figure 10: Marketing stages

Administrating Planning

The group distributed responsibilities to all group members. The group members understood their duties very well. They could finish the work intime following orders from customers. There also had a record for working hours of all group members in order to earn income every month based on the group profit. The group had a group meeting every month to update the group information, orders, responsibilities, and planning, these activities are well strengthening the group operation.
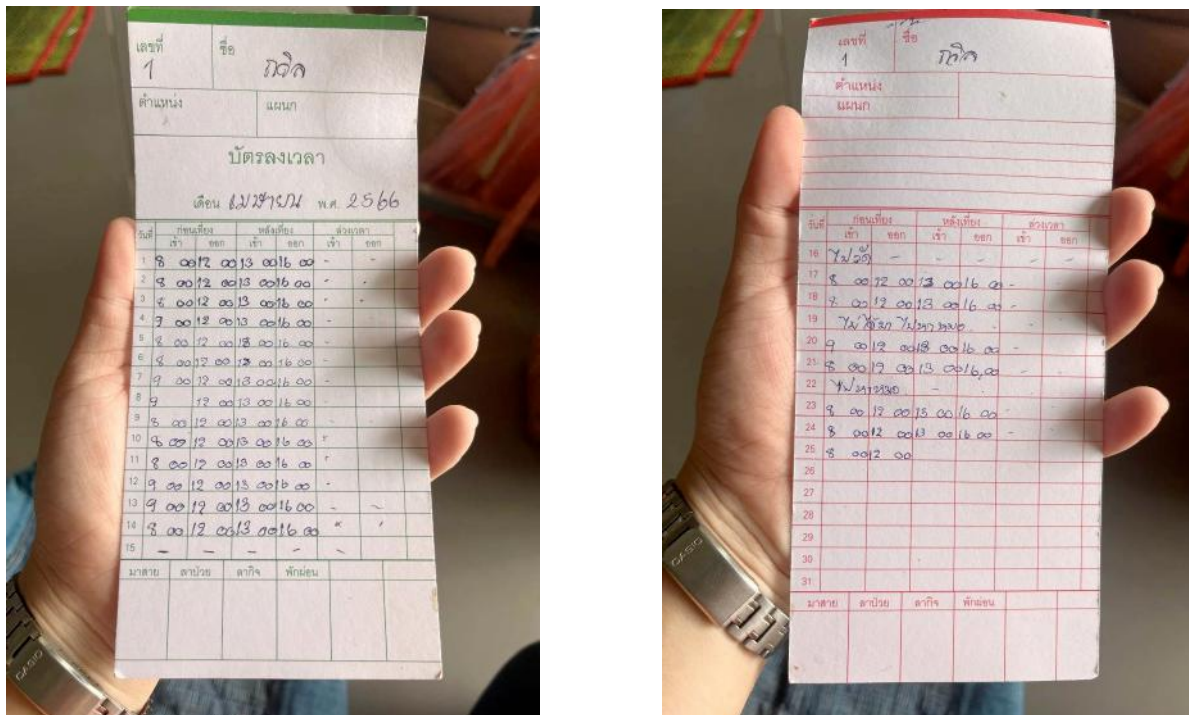
Figure 11: Record for working hours

Financing Planning

The group committee member will calculate earning for group members every month based on the number of record working hours of each and the group profit. The group will have a meeting to plan for working capital every 3 months.

About subsidies that the group have obtained since 2004. From 2004 to 2006, the groups received 27,500 THB a year. After that, from 2007 to 2022, the group obtained 7,500 THB from subdistrict Administrative Organization (SAO). In addition, in 2023, the Ministry of Interior provided new building, equipment and tools for the group, about 12,000,000 THB. Therefore, the subsidies are important to strengthen for the group's operation in early stage until present. In summary, financial support from government is precious. Likewise, the group financing process such as the group has provided earnings to group members every month based on its profit.

Conclusion

The results of descriptive statistics; firstly, displayed that the Ban Don Koi Weaving Group has longevity which been operating about 20 years. As for the planning process, it showed

that the group has pre-order, market channels, and a credit to finish work intime are important things to strengthen the group, high product quality, these could be well representing the outstanding and strengthening of the group background.

Secondly, the strengthening characteristics of the group in terms of producing, marketing, administrating, and financing were clear clarified. The government had been supporting the group with some budgets, materials and knowledge since establishment. These subsidies are important to strengthen for the group's operation in early stage until present.

Finally, the results indicated that well planning process before producing, marketing, administrating, and financing activities were crucial and the group personnel working with systematic tasks and their discipline continuously were clearly strengthening characteristics of the group. Especially, working hour record activity and earning income of group members every month, these activities are major keys to keep the strengthened group operation.

As the study, a group of outstanding community business was selected to clarify the strengthening characteristics of community business in Sakon Nakhon province, Northeastern Thailand. The characteristics might occur only inside this selected group. Therefore, this study remains a limitation. In the future, it will be great to enhance studying in other outstanding community businesses.

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Development of Student Status Reports of a Faculty in University Using Interactive Microsoft Power BI for Effective Academic Administration

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Abstract

The student status report is generally designed for academic administration to get information to analyze the learning progress. For the case study at the Faculty of Industrial Education and Technology (FIET), King Mongkut's University of Technology Thonburi, there are 8 undergraduate programs, 7 master's programs, and 1 doctoral program. There are average number of 755 students per academic year for all undergraduate students, graduate students, and PhD students. The big data of FIET students could be retrieved from the Academic Information System (New ACIS) which shows the information of student admission, students' history, enrollment, request, study timetable, grades, etc. To support the student admission and academic administration, the data of student status was summarized to be an interactive report using Microsoft Power BI. The system has been continuously improvement from the academic year of 2012 to 2021. The online report included of 3 items: (i) current students registered in the system, (ii) graduated students, and (iii) students who dropped out. In addition, it also showed the grades before admission, current grades, category of application, education history, etc. This developed system could be conveniently reported via online to the administrators for planning and decision-making. The satisfaction of 10 users was evaluated with online questionnaire of 5-scale on 4 topics: ease of viewing, sufficient of data, benefits and outcomes, suitability of report, showing that the average score was >4. Moreover, there was suggestion to develop the system linkage between the faculty and programs to follow-up and analyze the progress of student learning.

Keywords: Information System, Student Status Report, Microsoft Power BI

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Introduction

Currently, the Faculty of Industrial Education and Technology at King Mongkut's University of Technology Thonburi manages its teaching and learning activities through 8 units, comprising 7 departments and 1 central unit, offering a total of 16 programs. These programs are divided into 8 undergraduate, 7 master's, and 1 doctoral degree programs. The faculty has established a vision for development: "Developing innovators and creators at the global level." The primary clients of the faculty are students, each with different qualifications based on the program level.

Student status is crucial information that the faculty needs for planning and operations in various aspects, such as student recruitment and selection, curriculum development, student tracking, and assistance. Currently, the information is collected from various university information systems to compile student status reports. However, the existing reporting methods have limitations, such as using paper-based or traditional information systems, which are not versatile in reporting student status data in various formats. The data may be outdated and not suitable for efficient decision-making and planning by the faculty management [1].

Previously, reporting the performance of the educational service unit involved document-based reports with extensive textual information, lacking interactivity and responsiveness to the needs of meeting participants and faculty administrators. During regular faculty committee meetings at the end of each semester and academic year, the "Student Status" report was presented by extracting data from the Educational Management Information System (NewAcis) in the form of Excel files. This report aimed to provide the faculty committee with an overview of student status in each department, such as academic probation for undergraduate students with a GPA below 2.00 and for graduate students with a GPA below 3.00, as well as dropout and dismissal status for students with a GPA below 1.50 or voluntary withdrawal.

The manual reporting process consumed significant committee time in evaluating student status during each reporting period, prompting the researcher to identify the causes and problems in the reporting process. To address these issues, the researcher developed an information system to generate easily interpretable and convenient student status reports for the faculty committee. This system utilized an interactive presentation format under Microsoft Power BI, covering various aspects of student information, such as recruitment channels, year levels, program levels, and academic performance. The developed information system aims to provide a comprehensive and user-friendly overview of student status for efficient analysis and decision-making by faculty administrators [2].

Objectives

This research has 2 for objectives Development of Student Status Reports of a Faculty in University Using Interactive Microsoft Power BI for Effective Academic Administration.
1. To develop database to interactive report
2. To analyst big data base on student status

Methodology

Step 1: Study the Requirements of Executives or Customers and Current Information Through the SIPOC System

Utilize the SIPOC model (Supplier, Input, Process, Output, Customer) to analyze and understand the current data processes. The desired outcome is to generate information reports requested by the executives of the Faculty Industry of Education and Technology (FIET). The SIPOC model serves as a tool for analysis, aiding in the identification of relationships between the producer, input data, process, output, and customers. This helps in obtaining insights into the functioning of the system. The executives aim to receive information that is informative and aligned with the system's operational requirements [3].

Step 2: Study Standardized Information Reporting Systems

The researchers investigated information reporting systems that adhere to standards and are efficient in presenting flexible reports. Systems capable of analyzing large-scale data were explored, and Microsoft Power BI emerged as the supported software within the organization.

Step 3: Design and Plan Existing Data for Reporting System Integration

Designing and planning existing data involves considering user requirements and organizing data systems to efficiently support reporting. This includes structuring data to enhance its usability within the reporting framework, utilizing the university's information system database (NewAcis) [4].
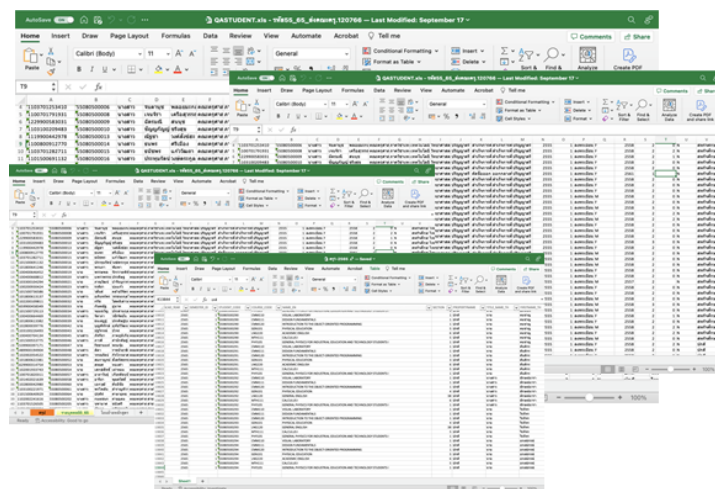
Figure 1: Database before Management with Microsoft Power BI
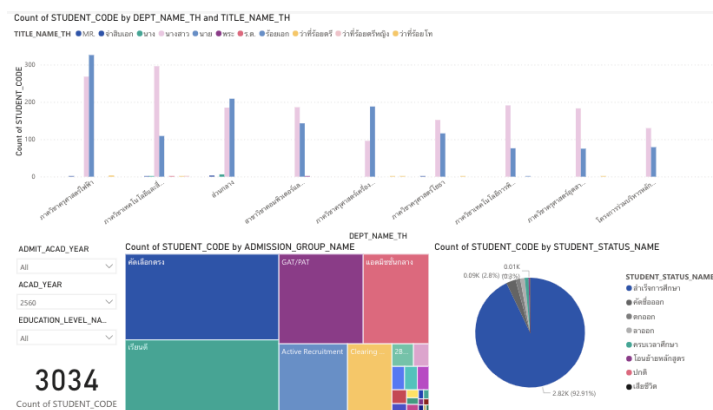
Figure 2: Data Management with Microsoft Power BI

Step 4: Database Management and Data Integration With Microsoft Power BI

Initiate database cleaning, administer database management as shown in Figure1, and design report presentations categorized by student status, such as status, completion status, and dropout status. Ensure clarity and ease of understanding in report design. Integrate the database with Microsoft Power BI for efficient and responsive reporting that effectively meets user requirements was shown in Figure 2.

Step 5: Evaluate User Satisfaction With the System

Present the new reporting system and products to users to assess their satisfaction and gather their feedback. This evaluation can be conducted through surveys or feedback activities to facilitate continuous improvement of the system and future reporting. Listening to user suggestions is crucial in developing and enhancing the system to meet the organization's needs.

The key aspects to consider are as follows:
1. Ease of data selection
2. Adequate data quantity to meet needs
3. Benefits and insights gained from system usage
4. Analyzability for planning student development
5. Suitability for reporting purposes

Results

The research revealed that the Student Status Information System developed using Power BI had the capability to present student status data comprehensively and understandably. User satisfaction with the system was at a high level of 5 (Very Satisfied), with an average rating of 4.71 and a standard deviation of 0.47 (N=14), indicating a considerable level of satisfaction with the system.

Users of the Student Status Information System express satisfaction in various aspects:

Convenience in Data Selection (4.44):
Users report that the system allows for convenient data selection, demonstrating progress and ease of use.

Adequate Data Quantity for Needs (4.22):
The system provides enough data that meets users' needs without exceeding or falling short.

Benefits and Gains from Usage (4.55):
Users feel that the system is beneficial and provides what they need adequately.

Capability for Further Analysis and Student Development Planning (4.44):
The system can be used for analysis, contributing to effective student development planning.

Suitability for Reporting (4.33):
The system is considered suitable for reporting data in line with user requirements.

Conclusion

The research findings demonstrate that the Student Status Information System utilizing Power BI was effective in providing timely information and receives high user satisfaction. The system's user-friendliness and progress in data selection contribute to a sense of convenience for users. Additionally, the system proved beneficial and suitable for analysis, supporting student development planning. This signifies a significant success in developing a system that meets the needs of the current educational environment.

Suggestions

1. Enhance the Feature for Comparing Data Between Academic Years:
Adding the capability to compare data between academic years will make it easier for users to examine trends and changes in data. This is beneficial for academic planning and decision-making.

2. Display Individual-Level Analysis Based on OBEM:
Importing a feature that displays individual-level analysis based on the Outcome-Based Education Model (OBEM) will assist in immediate improvements in areas that require development. Additionally, students and staff can gain an overview of the system's success in teaching and learning.

3. Link Analysis Results to Competency Levels in the Curriculum:
Linking analysis results to competency levels in the curriculum being studied or completed would be highly beneficial for generating reports summarizing students' development in a semester-wise format.

4. Establish Connections With Student Admission Information:
Developing connections with student admission data will aid in tracking and analyzing the effectiveness of students throughout their academic journey.

5. Increase Connectivity With Soft Skill Data:
Adding information about non-professional skills (Soft Skills) will contribute to creating a comprehensive overview of students' overall skill development. This is advantageous for preparing students for the workforce.

6. *Establishing Policies for Student Care and Reducing Future Student Dropout Rates:*
Develop and implement policies aimed at student care with the objective of reducing the likelihood of future student dropouts. These policies should encompass proactive measures to support students in both academic and non-academic aspects, fostering a positive and inclusive learning environment. Regular assessment and adjustments to these policies are essential to effectively care for students and minimize the potential for future dropout incidents.

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Anxiety of Primary Students' Teacher in Learning Statistics and Its Relationship to Statistical Learning Outcomes

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Abstract

Learning statistics are useful for primary students' teachers, although they are prepared to be primary school teachers. Statistics can develop student's critical thinking, logic, and necessary in completing their final project, but some student's teachers do not notice and also have learning anxiety which affects their learning outcomes achievement. Learning anxiety is caused by many factors and must be reduced to achieve maximum learning outcomes. This study explores the relationship between statistical learning anxiety and learning outcomes and describes what factors make students anxious in learning statistics. This study used a quantitative approach that explored the relationship between statistical learning anxiety and statistical learning outcomes using the non-parametric test by Spearman Rank correlation test. Data was collected through tests, questionnaires, and student reflections. Test and anxiety questionnaire results analyzed quantitatively, while the results of interviews and reflections will be analyzed qualitatively. Statistics questions tests are arranged based on statistical learning objectives; questionnaires are arranged based on learning anxiety indicators. The subjects of this study were 72 students of the primary student's teacher. The results showed that there was a relationship between statistical learning anxiety and statistical learning outcomes in primary student's teachers. Students' statistical learning anxiety has impact to encourage students to achieve their learning outcomes goals. Based on interviews and reflection data, some of the factors that influence student anxiety include information from seniors who say statistics subject so difficult, mathematics prior knowledge students still relatively low, and their fear of the risk of failing in statistics subject.

Keywords: Learning Outcomes, Statistic Anxiety, Students Teacher

Introduction

Statistics is a science that discusses data collection, data presentation, data processing and data generalization (Riyanto, 2018). All study programs at universities in Indonesia are equipped with Statistics courses, including for prospective elementary school teachers (González, Rodríguez, Faílde, &; Carrera, 2016; Rangkuti, AN, &; Fitriani, F, 2019); Subekti, FE, & Akhsani, L, 2020. Tishkovskaya, S., & Lancaster, G. A., 2012). Elementary school teachers in general are teachers who can teach various subjects because their learning is based on themes known as thematic learning. So, prospective elementary teachers also need to learn statistics because they are also prepared to teach elementary mathematics. In addition, statistics can also help train someone in solving problems, thinking critically, and making the right decisions based on data (Kesici, Baloğlu, & Deniz, 2011). Statistics help students develop their thinking skills in solving various problems. Statistics focuses on concepts, data, and inference, how to describe inferences about phenomena based on existing data. Statistics is also very applicable and is indispensable in everyday life and various fields (Chasanah, AN, Wicaksono, AB, 2020). Statistics are open to interpretation and have no absolute certainty value because generalizations depend on sample data, so no one can determine their truth. So, statistics are needed for prospective teachers both in work as teachers and as significant members of society.

Prospective elementary school students need to understand what statistics are and why statistics are important. If students can understand problems, design experiments, and collect data, conduct surveys, and ask important questions, students will feel a significant impact from statistics so that students can feel the great contribution that students can make when they master statistics courses. However, students often focus more on the difficulty of learning statistics and their final learning results, so students do not enjoy the process developed in themselves while studying statistics. Their difficulties and obstacles in learning and focusing on the result, this is what triggers their learning anxiety to appear. Anxiety about learning statistics is common in social science students, including Primary student's teachers. This is due to the lack of school mathematics knowledge and the unpleasant previous mathematics learning experience (Malik, S., 2015; Paechter et al., 2017).

Learning anxiety can cause students to lose confidence in learning mathematics (Panitz, T. 2023). Learning anxiety can hinder learners in achieving their designed learning goals (Aryani and Hasyim, 2018; Wulandari & Agustika, 2020). Statistical anxiety is slightly different from mathematical anxiety because statistics deal with procedures, using more than mathematical symbols; The cognitive process of statistical anxiety is different from mathematical anxiety. In addition to the manipulation of mathematical symbols, statistical anxiety is more associated with linguistic understanding of data processing. Statistical anxiety creates significant inconsistencies with respect to cognitive processing compared to mathematical anxiety (González et al, 2016). But these two anxieties are interrelated. Statistical anxiety is strongly associated with math anxiety as well as learning anxiety in other related areas (Yang, S. 2021). Learners with high math anxiety tend to be more anxious about statistics as well.

Anxiety will usually arise if the student faces a situation that he considers threatening. This condition will make students think negatively of themselves. Math anxiety often results from unpleasant experiences in learning mathematics (Panitz, T, 2023). Students who feel excessive anxiety often make mathematics a subject to avoid (Priyani, 2013). Anxiety is a psychological condition full of anxiety due to certain things that can affect including: (1)

physiological conditions such as heartbeats, heart palpitations, paleness, nausea, (2) cognitive conditions such as difficulty concentrating and (3) psychological conditions such as feelings of pressure or fear (Nazliati, N, Sari, R, & Fitriani, F. 2019). Math anxiety is a feeling that involves fear when faced with the possibility of handling Math problems (Febryliani, 2021; Soewardini, H.M.D, 2019). All Primary student's student teachers from Pelita Harapan are students who get scholarships and are bound by various regulations. One of them is the GPA standard that they must achieve every semester and are expected to be completed in 8 semesters during their education. In addition, there are several conditions that must be met, for example, being able to take the first field Experience course on the condition that the course fails a maximum of two courses. Students are also required to live in dormitories, so they have an incredibly open connection with information from their seniors. So that this becomes the situation behind their condition, anxiety, and achievement.

Although failure to learn statistics is entirely influenced by learning anxiety, it is necessary to measure how much anxiety will affect their math ability and what factors affect their math anxiety. This is to be able to help what actions need to be improved to provide a better learning experience for students so that the goals of education can be achieved. This study's purpose is to determine the relationship between statistical learning anxiety and learning outcomes and describe the factors that cause student statistical learning anxiety. By knowing student anxiety, helping to provide information on student learning needs so that learning goals and objectives can be achieved properly because intervention on student mindset will be effective in improving student academic achievement (Bostwick K. C. P., Becker-Blease K. A. 2018).

Methods

This study used a quantitative method approach by looking at the relationship between statistical learning anxiety and statistical learning outcomes using the Spearman Rank non-parametric correlation test with the help of SPSS. Data was collected through learning outcomes, questionnaires, closed student interviews. Learning outcome data obtained from test results and questionnaire results are processed quantitatively, while closed interviews will be analyzed qualitatively. The subjects of this study were 72 primary prospective teachers, Teacher Education department.

Result and Discussion

From the data from the questionnaire of 72 Primary prospective teachers, it was obtained that there was a relationship between statistical learning anxiety and student learning outcomes. From the results of SPSS calculations using the non-parametric Spearman Rank correlation test, the following data were obtained:

			Learning_Outcomes	Anxiety
Spearman's rho	Learning_Outcomes	Correlation Coefficient	1.000	.294[*]
		Sig. (2-tailed)	.	.020
		N	72	72
	Anxiety	Correlation Coefficient	.294[*]	1.000
		Sig. (2-tailed)	.020	.
		N	72	72

Table 1: Correlation between Student's Anxiety and Learning Outcomes

From table 1: significance value of 0.02 indicates Ho is rejected, meaning that there is a correlation between statistical learning anxiety and the value of statistical learning outcomes. By comparing the values of Z count and Z of the table obtained the calculation as follows: $Z = rs\sqrt{(n-1)} = 0{,}294 \sqrt{(71)} = 2{,}48$ and $Z_{table\,(0{,}05)} = 1{,}64$. So, Ho was rejected, meaning that there is a correlation between learning anxiety and student statistics learning outcomes. The correlation value is 0.375 when viewed $R^2 = 0{,}086$ This means that learning outcomes are only affected by 8.6% of their learning anxiety. The positive correlation value shows the learning anxiety experienced by students encouraging students to learn better. College students' anxiety is not high anxiety but low and moderate anxiety. Where students can still control their anxiety into learning motivation, they are learning more statistics with various support systems provided such as tutorials and peer tutors.

When viewed from the results of the questionnaire, most students experience anxiety about learning statistics. The results of the questionnaire showed that 15% of students did not experience anxiety in learning statistics, but 85% experienced anxiety in learning statistics. Students stated that they were afraid of getting a failing grade in the statistics course. The following are the results of student questionnaires that state that students are afraid of failing in the educational research statistics course:
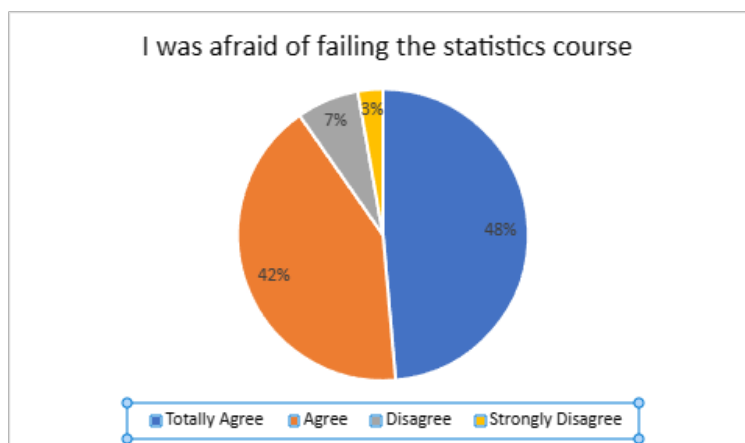
Fig. 1: Student Afraid About Failing in Statistics Course

From fig.1, only 10% of students are not afraid of failure while 90% have a fear of failing in statistics courses. From the results of closed interviews, students are afraid to fail the statistics course because of their poor mathematical skills and material that is still not mastered, the results of quiz and midterm test scores are low, the results of their achievements in that semester will be decisive in participating in the field experience program. If any course fails, it will have a significant impact on the subsequent course contract. However, students do the

tasks given and learn as well as possible. Even so, there are students who are not afraid to fail in statistics courses because students assume that if they have the intention to learn and want to try, students believe that it is important to practice a lot and they want to prove that statistics is not as difficult as what many people say. There are also students who make their worries a motivation to learn this course and try to always encourage themselves to continue learning and mastering the subject matter.

Students experience anxiety before taking tests, both quizzes and written exams such as midterm and final test. Students are anxious when they are approaching the exam because they have not studied optimally in preparing for the exam, unable to complete the questions given correctly, the form of exam questions that are different from the sample questions given in class, the number of assignments they have to collect during the exam week and will interfere with their exam preparation. After exams, students are anxious about their test scores because they have not been as expected and there is no chance of remedial. Students feel that they have prepared for the exam seriously, but the results are not as expected. But even so, when viewed from the results of the questionnaire, students prepare themselves before there is a test. Here is the data from the questionnaire:
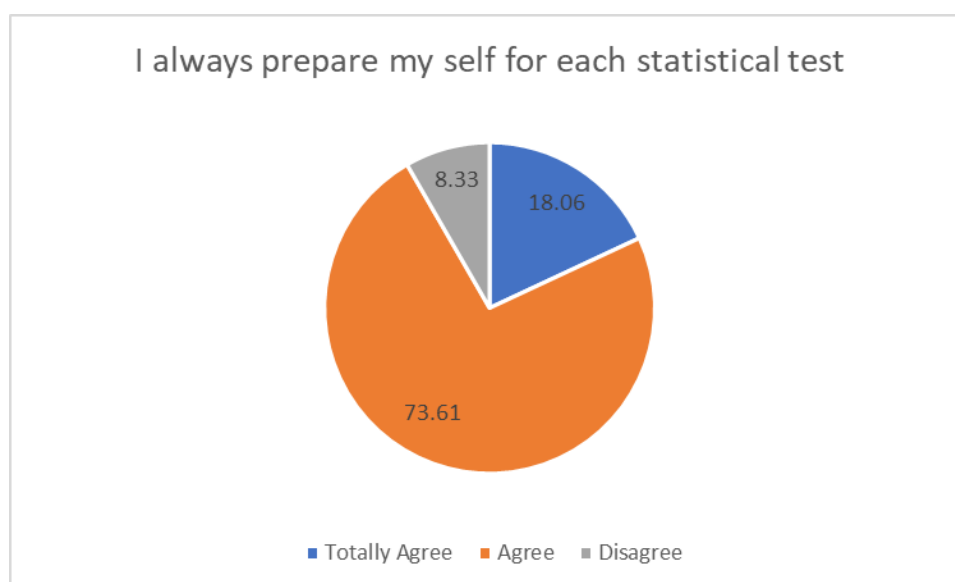
Fig. 2: Student Prepare Their Self for Each Statistical Test

When viewed from the results of the questionnaire in fig. 2 data, although there is anxiety in students, 91.67% of students prepare themselves before the test. Only a small percentage did not prepare well before they took the statistical test, which was 8.33%. Even though they have prepared themselves for the exam, there is still a feeling of fear in students in facing the exam, because the ability to analyze questions is still low, sometimes lack focus and forget what stages to do to do the questions, lack confidence in the answers, and consider the test difficult. But students feel they must learn more than usual. Students who do not prepare well are also very worried because of lack of preparation. Unlike students who do not experience the anxiety of studying statistics, they can manage their emotions well. During exams, students have a unique way of preparing themselves, so they do not tend to panic during exams. In addition to these reasons, there are students who are not so focused on the results; the important thing is that they have done their best in learning. They do not feel anxious and afraid when learning something new and realize that their worries will hinder them from following the learning.

In addition to feeling anxiety before and after the exam, there are also students who experience anxiety during learning when students are appointed to come forward but cannot explain. Yep, (2023) found that students are worried about getting negative ratings from peers if they cannot do the assigned tasks well. In addition, students also experience anxiety about their ability to understand the material explained by the lecturer and consider statistical material to be difficult in nature. There are students who feel anxious when comparing themselves with their friends who have mastered the learning material during class, but they cannot understand learning. Students immediately judge themselves as not being able to master the lesson because their other friends have mastered it. In addition, students' low understanding of mathematics affects students' statistical learning anxiety (Smith, Brumskill, Johnson, & Zimmer, 2018). Students are not yet confident in their mathematical skills in solving statistical problems. The following are the results of the student questionnaire regarding his confidence in solving statistical problems:
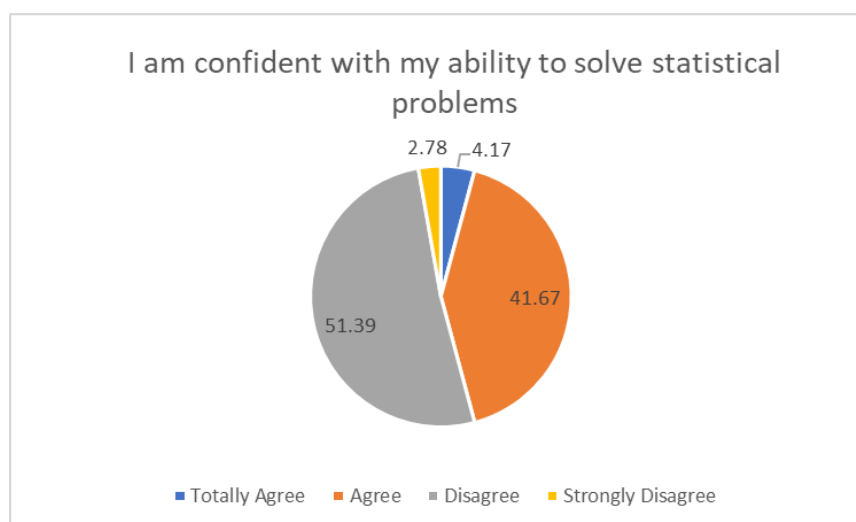
Fig. 3: Student Confident With Their Ability to Solve Statistical Problem

From fig.3, as many as 54.17% of students admitted that they did not have confidence about their ability to solve statistical problems while 45.83% had confidence that they were able to solve statistical problems. In addition, doubts about students' ability to solve and capture statistics lecture material due to lack of initial knowledge of mathematics. Students admit that they are weak in mathematics, have difficulty understanding material concepts, analyzing problems, and applying what formulas will be used. Although many students consider statistics difficult, some students can see the difficulty in learning statistics with different sides. Some students consider statistics not so difficult because the calculations are accompanied by tables that can make it easier to do problems, after attending statistics classes students will be able to master if they focus on listening to the lecturer's explanation in class well, doing exercises seriously and learning more. Some of the things that students do in statistics lectures include always asking friends to study together and asking friends and tutors about material that is not understood, trying to motivate themselves that statistics can still be mastered if they want to practice.

When viewed from the results of closed interviews, things that cause student learning anxiety in learning statistics include: Information obtained from previous seniors that many students who have finished taking this course say that statistics courses are difficult and many students do not graduate in statistics courses. The fear of students if they fail and repeat the statistics course is the main cause of their anxiety. The weight of statistics courses as much as 3 credits

will have a major effect on students' GPA and can affect the courses they can teach in the next semester. Students consider statistics a difficult subject because many formulas and concepts are quite difficult for students to understand (Nurhusain, M, & Hadi, A, 2021). Many students admit that they find it difficult to compile hypotheses and other concepts in inference statistical materials, especially some lecture materials in English. The limited mathematical ability of previous students also makes it difficult for students to understand the material, analyze problems, and apply what formulas will be used (Gurat, M.G., 2018). College students need more practice. In addition, interrelated material factors also affect the mastery of student material because when there is material that students do not understand, it will affect the mastery of the next material.

Conclusion

The results showed a correlation between statistical anxiety and the achievement of mathematics learning outcomes. Student anxiety in learning statistics can still be controlled so that it has an impact in encouraging student enthusiasm in achieving good learning outcomes. The main cause of student anxiety is their fear of failing the course because they see their seniors who repeat by seeing their low math skills and students trying to learn so as not to fail in statistics courses. However, educators need to make students feel comfortable in learning statistics first (Condron, D.J, 2018). Students also experience anxiety when facing exams because students have concluded that statistics courses are difficult, and students' statistical skills are low and their fear of not passing statistics. This condition is a consideration in assessment that does not focus on the form of written assessment and does not focus on the assessment of the form of written tests but the growth of students in learning and can experience the benefits of learning statistics in their daily lives and the benefits they feel in learning. It is necessary to shape the mindset of students by seeing the good impact if they master statistics because they can feel statistics in various aspects of their lives. In line with the results of Nasution's research, S.H. (2019) that interactive tasks with stages of analysis, design and development can reduce student anxiety in doing mathematical tasks. In addition, the results of research by Smith, T.F. (2019) found that by approaching how the mindset of students, how statistics affect their lives, their growth-oriented mindset will reduce anxiety about learning statistics.

Acknowledgments

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Empower Girls Creativity Through Use of Digital Technologies:
A Learning Programme for Girls (SparkDigiGirls)

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Abstract
Research shows that girls choose their professional future based on stereotypes, often under the family influence. The area of technology is the one where we find fewer girls, due to the lack of role models or examples of successful women. In response to this need, a group of partners involving universities and associations from Lithuania, Slovenia, Greece, and Portugal developed a project over two years. It started with a compilation of good practices and round table discussions with people who are relevant in the subject area in each country. With the data collected, it was possible to identify subjects and technologies to develop a learning programme for girls. A programme of 16 challenges was developed based on girls' interests that could be solved using technology. The Moodle platform was used to set up the whole structure. Each challenge includes theoretical information about the technology through video. Followed by tutorials where girls can learn how to use the tools. In the end, they must submit evidence of the challenge and fill in a quiz that tests their knowledge. A pilot test was then conducted with 279 girls from the four countries, aged between 14 and 18, for 2 months. The results were very positive, with the girls showing a change of view towards technology. All this experience made it possible to create a guidebook for mentors and organizations that work with girls, which will allow them to attract more girls to the area of technology.

Keywords: SparkDigiGirls, Learning Programme, Girl ICT Empowerment, STEM, Non-Formal Education

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Introduction

Persistent gender stereotypes and misconceptions about careers in technology and engineering contribute to disparity between male and female in ICT. In this context teachers and educators can play a crucial role in reshaping this perspective by providing guidance and opportunities for girls to experience a different narrative (Marques, Manso, Grinevičiūtė, Danielien, 2022; Marques, Araújo, Grinevičiūtė, Danielien, 2023).

From younger age, even in primary school, both boys and girls exhibit a similar inclination toward pursuing careers in science-related fields (Noonan, & Laffarge, 2017). Nevertheless, as they progress through subsequent school years, girls tend to shift their attitudes and preferences, showing a greater inclination towards careers in social, environmental, and medical domains rather than in science, technology, engineering, and mathematics (STEM) and ICT studies (OCDE, 2018). This shift can be attributed to biases, a lack of role models, and other factors that hinder girls from fully capitalizing on the opportunities presented by digital transformation (Lambrecht, & Tucker, 2019; Neerukonda, & Chaudhuri, 2018). Eurostat's 2021 data reveals that girls and women remain underrepresented, comprising only 19.1% of all ICT students in the EU. Among the focus countries of the SparkDigiGirls Project, Lithuania displays the highest percentage of women in ICT at 23.7%. Greece and Portugal follow with 21.3% and 20.7%, while Slovenia exhibits the lowest percentage at 16.6% (Eurostat, 2022).

Recognizing this need, partners from Lithuania, Portugal, Slovenia, and Greece initiated the two-year international project SparkDigiGirls, funded by the Erasmus+ strategic partnership in the field of youth, with the titled "Empower Girls Creativity Through the Use of Digital Technologies" (SparkDigiGirls)[1]. The aim of the project was to inspire girls to explore digital technologies such as Augmented Reality (AR), Artificial Intelligence (AI), and other technologies, generating new and innovative ideas, leveraging their newly acquired digital knowledge to contribute creatively to the STEM industry, traditionally dominated by men (Marques, et. al., 2023).

It is recognized that increasing female participation in the IT sector is important for promoting diversity, economic growth, gender equality, and social impact (SparkDigiGirls, 2021). The project therefore emerged as a way of addressing these perceived needs. To this end, we will present the different phases of the project, identify the main results achieved and present all the outputs resulting from them.

SparkDigiGirls Project

The SparkDigiGirls project ran from 2021 to 2023 in a sequence of three main phases: 1) Diagnostic and curriculum definition; 2) Content development for the online programme and 3) Pilot study and dissemination.

Phase 1 - Diagnostic and Curriculum Definition

Through the diagnostic and curriculum definition phase, the first task was to identify the factors that prevent young girls from pursuing careers in computing and technology, and to

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[1] For more information visit: http://www.digigirls.eu/

provide practical examples and initiatives aimed at increasing girls' and women's interest in digital technologies. By conducting focus groups in the different countries, it was possible to gather insights, best practices, and perspectives from experts in the ICT-related sector on how to address these challenges and inspire and support girls to explore their creative potential in the field of digital technologies.

During the Focus Group, women were identified as being important to get involved in IT for the following reasons (Grinevičiūtė, et. al. 2021):

- Diversity: Women bring different perspectives, experiences, and skills to the IT sector, which can lead to more innovative and creative solutions. A diverse workforce can also help companies better understand and meet the diverse needs of their customers.
- Economic growth: The IT sector is a fast-growing industry and increasing women's participation can help address the skills gap and talent shortage in the sector. This can lead to increased economic growth and job creation.
- Gender equality: Increasing female participation in the IT sector can help address gender inequality and promote equal opportunities for women in the workforce.
- Social impact: The IT sector has a significant impact on society, and increasing women's participation can help ensure that technology is developed and used in ways that benefit all members of society.

From the analysis of the results obtained during the focus group (Marques, et. al. 2022), it can be concluded that there are several effective ways to increase girls' interest in technology, such as:

- Hands-on experience with ICT, products, and tools: Providing opportunities for practical application of new IT, products and tools can increase girls' interest in ICT. The more hands-on experience a girl has during her education, the greater her interest in ICT. Creativity in the classroom could also increase girls' interest in ICT and should be an integral part of the use of ICT.
- Female role models: Having visible female role models stimulates girls' interest in ICT careers and helps them to imagine themselves in these fields. Female IT students could be mentors and good role models, especially in their schools. This would be the kind of real action that would encourage other girls to choose IT. Girls and women need to see inspiration and role models.
- Teachers as mentors and non-formal education: If educators talk to girls about ICT subjects and actively encourage them, girls will be more attracted to these disciplines. Non-formal education, academies and educational projects encourage girls to think about studying ICT. Participants also emphasized the creation of mentoring programmes to foster girls' interest in ICT.
- Real life applications: Girls become more interested in ICT when they can imagine what they can do with these subjects, how they can be applied in real life situations and how they can be relevant to their future. Therefore, it is important to teach girls not only to play, but also to use technology in a meaningful way, whether exploring or creating.

Phase 2 - Content Development for the Online Programme

In the second phase of the project, the curriculum for the learning programme was developed: "Unleash Your CreativITy with Technology" programme. A MOODLE-based platform (figure 1) was used to create a sequence of sixteen challenges that the girls could complete

asynchronously and to be used in non-formal education context. This consists of sixteen separate learning modules covering specific topics or areas of interest for young girls age 14+ using several technologies. The learning programme was initially developed in English and then translated and adapted into the languages of each of the partner countries.
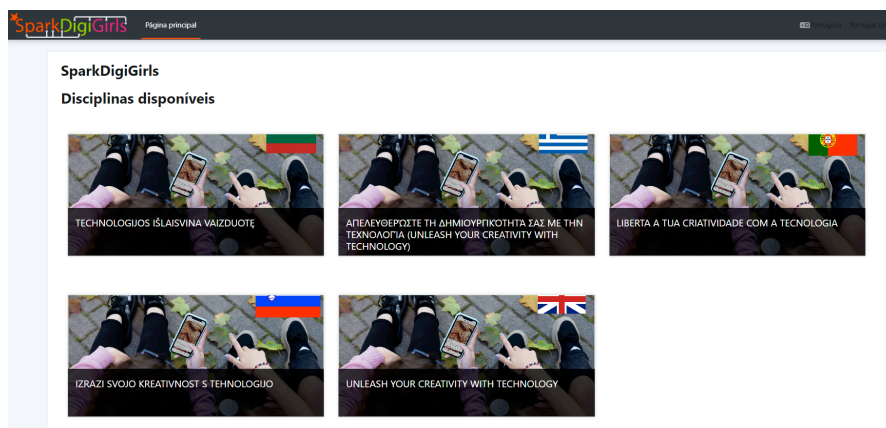
Figure 1 - Online training programme in five languages (https://moodle.digigirls.eu/)

A total of sixteen challenges (figure 2) have been created and organized with
- A learning guide with an introduction and instructions.
- Videos from YouTube to introduce different digital technologies that will be used in the challenge. Each video aims to explain how these technologies work and what they are used for. In some of the videos, an interactive layer has been added using the H5P tool to point out important information in the video or to answer questions.
- Presentations in pdf or ppt files are used to present concrete tutorial tools or step-by-step activities in a clear and summarized way.
- At the end of the challenge, the girls must take a quiz, which is a way to test their knowledge in each challenge.
- It is also necessary to submit evidence of having completed the proposed challenge, it can be an image, link, video, audio, etc.
- After completing each challenge, a certificate is automatically issued by the platform.
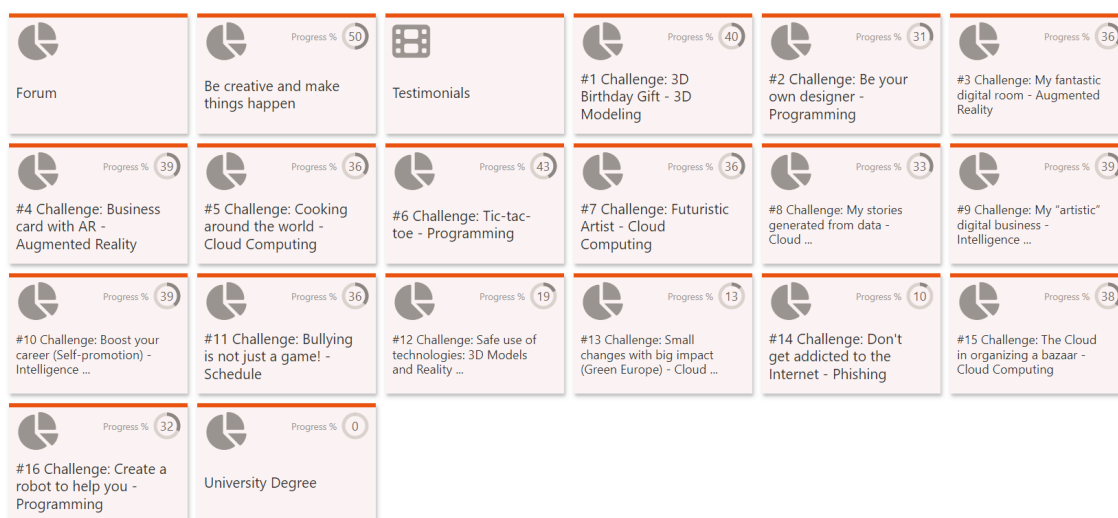
Figure 2 - Module organization of 16 challenges
- Unleash Your CreativITy with Technology

The challenges were designed to develop girls' digital skills and critical thinking skills, covering specific topics or areas of interest to the young girls using different technologies, such as:

- Artificial Intelligence (AI): AI was used in several challenges, such as the 'Futurist Artist' challenge, where the girls created an online gallery and put all their art in NFTs format.
- Augmented Reality (AR): AR was used in the 'Be your own designer' challenge, where girls created a fashion game using Scratch and drawing using SketchAR.
- Internet of Things (IoT): IoT was used in the "Small changes with big impact" challenge, where girls developed their own carbon footprint.
- Programming: Programming was used in several challenges, such as the "Pinch of food creations" challenge, where the girls created a website using Wix, and the "Tic-tac-toe" challenge, where they created a fun tic-tac-toe game.
- 3D modelling and printing: 3D modelling and printing was used in the "Birthday present in 3D" challenge, where girls learned how to make a birthday present in 3D.
- Cloud computing: Cloud computing was used in several challenges, such as the "Tic-tac-toe" challenge and the "Pinch of food creations" challenge.
- Blockchain: Blockchain was used in the "Small changes with big impact" challenge and the "Futurist artist" challenge.

To promote female role models, interviews were conducted with IT professionals or women in leadership positions. This resulted in the production of several videos, which are available on the project's YouTube channel (figure 3). These are also available as the testimonial module to the learning programme (figure 2).
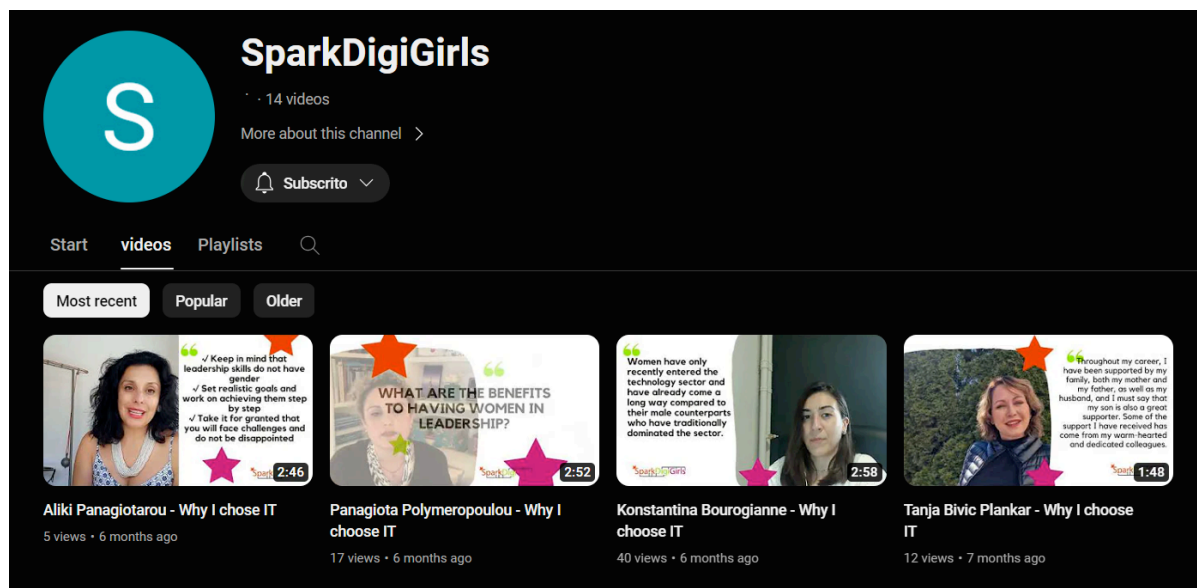
Figure 3 - Youtube channel with female testimonials
(https://www.youtube.com/@SparkDigiGirls1)

The project created two levels of certificates: one for each learning mode (Challenge) and a Grand Certificate (it depends on the number of Challenges completed by the learner).

To obtain a Grand Certificate, it is necessary to complete a challenge from six different technologies (artificial intelligence, augmented reality, Programming, etc.). After completing each challenge, the learner receives the challenge certificate, which has a specific key. When

the learner has collected six keys (one for each technology), he can unlock the Grand Certificate of the Programme.

The certificates are designed to recognize learners' achievements and provide them with tangible evidence of their skills and knowledge. They can be shared on social media or printed as a symbol of the learner's achievement.

Phase 3 – Pilot Study and Dissemination

During the final phase of the project, a pilot test was developed and implemented in the different partner countries. From January to March 2023, a group of 279 girls between the ages of 14 and 18 wanted to develop their creativity using digital technologies.

The pilot test of the SparkDigiGirls programme produced interesting results. It took place over two months and each partner had the autonomy to organize the way they worked with the girls. The initial work was proposed to be entirely online, with the girls able to ask for support from youth workers or partner experts. However, only the Portuguese partner maintained this methodology, while the others opted to organize face-to-face sessions with the girls to motivate them to complete the challenges (Marques, et. al, 2023).

The results of the pilot test showed that the average number of challenges submitted per active girl was similar between Portugal and Lithuania, indicating that the girls found the challenges stimulating, even if they completed them autonomously. The use of the challenges varied between partners, with some partners choosing to set up regular face-to-face sessions with the girls, while others integrated the challenges into activities already planned with groups of girls (Marques, et. al, 2023; SparkDigiGirls, 2023). This enabled more girls to complete the challenges in groups in countries with regular sessions.

The pilot also showed that some challenges had low submission rates and that some materials needed to be revised for language details and to replace a digital tool that did not work as originally intended. In addition, the youth workers agreed that the challenges created could be integrated into girls' non-formal education and run as a club, and they suggested that a mixed format of online and face-to-face training would be most appropriate for the programme.

In summary, the pilot allowed each partner to test the appropriate conditions for the local context and to validate the materials provided for each of the languages. The results showed that the programme has the potential to engage and empower girls to use technology, solve real-life problems, develop creativity, and enhance personal development.

In order to disseminate the learning programme to those interested in working with girls, an e-guidebook (SparkDigiGirls, 2023) has been published that aims to empower youth workers to act as mentors and support girls' creativity in digital technologies.

The e-guidebook is divided into five units, each covering a specific aspect of the project (SparkDigiGirls, 2023):
- Unit 1 introduces the project and the Unleash Your CreativITy with Technology learning programme. It also discusses the lack of female participation in IT and the factors and stereotypes that influence girls' low involvement and interest in digital technologies.

- Unit 2 focuses on youth workers as mentors and provides guidelines for supporting and activating girls' creativity in digital technologies. It discusses the results of the SparkDigiGirls pilot training.
- Unit 3 discusses empowerment and communication practices for blended learning in ICT. It suggests a blended learning approach for the learning programme after the results are achieved and discusses ways to sustain the learning process and maintain attention.
- Unit 4 presents best practices and success stories from the SparkDigiGirls pilot and ways to engage girls in digital technologies. It also includes reflections and feedback from the pilot training.
- Unit 5 provides additional resources, including toolkits and case studies, to enhance teaching and learning activities. The e-guide concludes with a summary of key points and references.

The e-Guidebook is expected to provide valuable information and best practices for youth workers to support girls' creativity in digital technologies. It highlights the importance of mentorship and empowerment in the development of opportunities for young girls in the IT world.

Conclusion

This paper presents the Erasmus+ SparkDigiGirls project, which ran from May 2011 to July 2023. The inspiration behind the project was to address the low participation and interest of girls in digital technologies and to empower them to explore their creative potential in the IT sector. The project aimed to identify the factors that prevent young girls from pursuing careers in computing and technology, and to provide practical examples and initiatives focused on increasing girls' and women's interest in digital technologies. The project sought to gather insights, best practices and perspectives from experts in the ICT-related sector to address these challenges and to inspire and support girls to explore their creative potential in digital technologies.

The findings from the different phases of the project allow us to conclude that providing hands-on experiences, female role models, mentoring programmes and real-life applications can be effective ways to increase girls' interest in technology (SparkDigiGirls, 2022).

The learning programme developed aimed to empower young girls in the digital world, give them the skills, knowledge and confidence to pursue careers in technology and encourage them to become creators and innovators, not just consumers of technology. The project involved a pilot training programme that provided an exciting opportunity for girls to learn about digital technologies and develop their skills (Marques, et al., 2023).

The results of the pilot training were positive, with the girls showing enthusiasm and interest in learning about digital technologies (Marques, et. al, 2023; SparkDigiGirls, 2023). The project partners reported that the girls had the opportunity to be trained and to share their experiences (Marques, et al., 2023). The supportive environment, the role of the mentors and the engaging activities played a positive role. The blended delivery of the programme together with effective communication tools, supportive mentors and peer and collaborative learning were some of the key factors in improving girls' participation in technology projects (SparkDigiGirls, 2023).

At the end of the project, several resources were made available for students and teachers that can be used to enhance their teaching and learning activities. These resources include toolkits, case studies and good practices that can be used to support and activate girls' creativity in digital technologies.

Finally, the SparkDigiGirls project can be considered successful in empowering young girls in the digital world and increasing their interest in IT (Marques, et. al, 2023; SparkDigiGirls, 2023). The project provided valuable resources and best practices for youth workers to support and activate girls' creativity in digital technologies and demonstrated the importance of mentoring and empowerment in increasing opportunities for young girls in the IT world.

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Learning the Principles of Narrative Frames: A Pilot Study

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Abstract

This study explored the strengths and weaknesses of using narrative frames when conducting qualitative research. The focus was on eliciting information regarding participants' (N = 11) beliefs as they entered a postgraduate program at a major university in Japan. The theoretical underpinnings of narrative frames are discussed, the specific narrative frame employed is introduced, lessons learned regarding the analytic approach are shared, and perceived strengths and weaknesses of using narrative frames are offered. As this was a pilot study, the focus was on the narrative frame itself. While the use of this narrative frame was useful for gathering data, it was found to be limiting in scope, and needs supplementation with other qualitative and quantitative data sources to reach its full potential as an investigative resource.

Keywords: Narrative Frame, Autonomy, Thematic Assessment

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Introduction

Narrative frames can succinctly be described as "a qualitative method of data collection using prompts to stimulate written expressions of ideas" (Barkhuizen, 2014). Interviewing participants to gather information and elicit detail is a highly involved and time-consuming activity, particularly when working with large groups. Narrative frames offer a more parsimonious method that can create instant physical data that is easy to input into an electronic format.

Orientation and Implementation

Because it is a type of knowledge that is created, Narrative Frames Analysis (NFA) falls under the constructivist paradigm of qualitative research. Under this view, the ontological orientation allows for multiple realities, and the epistemological orientation is focused on a co-construction of understanding between researchers and participants (Hatch, 2002). This allows a greater triangulation of data through prompts tailored to the research focus. By offering multiple opportunities for participants to expand upon their responses, researchers are able to perform a more informed analysis.

Although there is no spoken interview that is taking place in real time, the open-ended items can be seen as a dialogue between the researcher and the participant. Narrative inquirers control the creation of the narration, the audience it is directed towards, as well as the discourse of the society it is created within (Bochner, 2007). Bochner further describes the created narration as knowledge brought forward from the past as opposed to being knowledge related to the past (2007). Simply put, looking back at created narrations allows the reader a glimpse into the mind of the creators at that time, as opposed to a reflection back upon that time. The researcher guides the participant to answer openly without the type of constraints a multiple choice or Likert scale would create. Although the narrative is directed, the responses are completely open, revealing an immense amount of information about the writers and their intentions within their message (Chase, 2005).

During the analysis of these narrations, it is important for the researcher to maintain the correct perspective; while the causation of past actions may seem completely clear in retrospect, that cause might have been clouded at the time the narration was created. Another potential situation of concern is when current information might create a type of bias that did not exist during the time the narration was formed.

Narratives can be used to gather information regarding the activities and intentions of participants or, as with the current study, beliefs. A strong point of the narrative is its ability to capture the voice of participant, unfiltered or restrained with a series of pre-created answers to choose from, or having to choose upon a continuum where their perceptions lie in relation to a statement they may or may not agree with to begin with. With unrestrained freedom to use their own words, participants are able to convey themselves naturally through a written medium.

Current Study

The focus of the research was to use NFA to deconstruct the identities of postgraduate education students. This study was conducted using graduate students (n = 11) enrolled at university in Japan. The main focus was to gather information and decipher their

motivational constructs for joining, and to look for any commonalities or patterns. Also of interest was the efficacy of the implementation of narrations as a medium of gathering data for use in a qualitative study.

The purpose of the study was explained to the participants at the beginning of their program. The participants provided verbal and written consent for the use of their data in the study. Participants were given roughly 15 minutes to complete the narration, but in practice there was no time limit in place. Because the narration was not a test of ability, there would have been no purpose in limiting response time.

Of interest was not just the information gathered, but also the utility of the device itself; NFA is not as commonly employed as either an open-ended or a non-open-ended questionnaire The narration was created with the aid of an outside qualitative researcher who very generously oversaw the creation of the narration. Prompts such as *First, I believe language education…* and *I decided to study in a graduate program because…* were used to elicit personal information that could be coalesced into a broader picture; of interest were any similarities or trends between items and participants.

Analytic Approach

After retrieving the data, all information was entered into a spreadsheet using Microsoft Excel with each frame separated sequentially into columns and participants into rows then separately analyzed to triangulate the responses (Creswell, 2008). The reason for the initial individual analysis was an attempt to prevent any influence from one researcher to another at the interim stage (Clough, 2002).

Afterwards, the researcher engaged in confirmation checks with the participants. This was to ensure the accuracy of the reported data, to ask follow-up questions, and make revisions as needed.

Learner identity in the program showed that all of the participants considered themselves to be professional educators. All participants responded in a manner that demonstrated a self-representation as an educator. This identity was most commonly found to occur through noticing student needs, indicating a high degree of empathy on the part of the participants. For the purpose of anonymity, all participants have been given pseudo names. One participant, Arnold, stated "although competence in English is important for the growth of international business and relations particularly in Japan, English education is not taken very seriously here". Arnold was very empathetic in his responses to his students' need for English, and his perceived lack of competence in language education in Japan. This was unique, since Arnold was working in a private language school at the time, an industry that benefits the most from the lack of a comprehensive English language program in general education.

Tammy[1] described starting her career with the desire to know what language items students needed. Over time, the desire to know what was required for the curriculum became more pedagogically oriented, as she then wanted to know why the items were required. This ultimately led her to want to know how to assess which items were the most necessary. Another participant, Dave[2], explicitly stated a desire to "work hard towards filling the gaps

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[1],[2] Pseudonyms were used to anonymize the identities of the participants. should be used sparingly.

that current research does not report." There was no mention of career advancement as one of the motivations for entering a postgraduate program. Overall, there was a very altruistic sense in the way identity and motivation were oriented in the participants.

Motivation for entering the degree program followed a similar thread among all participants: the motivation to improve research pedagogy and research acumen. These motivations were given in connection to the desire to perform better as an educator and to add knowledge to the field of second language acquisition to benefit other educators. In all participants, a similar linear trend was observed.

Participants entered the beginning of their career as a novice educator, then broadened their sense of the field, their contributions, and their functions as an second language acquisition teacher. Going through the process of completing a master's degree helped them initiate a perpetuating process that created introspection, metacognitive pedagogical awareness, research interests, and a broader awareness of the field of language education. While these findings are not surprising, they are confirmatory of the expectation that postgraduate students in education would be motivated towards self-improvement. It would be incorrect to generalize these findings to all language teachers; however, the NFA retrieved exploratory and detailed information from which more specific research could be conducted.

The information and conclusions in the pilot study were insightful, but not unexpected. There is very little assistance from the government or places of employment for postgraduate education in Japan. Applicants willing to commit to a five to seven year terminal degree program and incur expenses which might not guarantee future career advancement are most likely highly intrinsically motivated. On the other hand, the origin and drive within each individual can only be fleshed out through qualitative research. NFA was highly efficacious in this domain.

Limitations

The narrative in the study was meant to cover a very wide topic among an extremely diverse crowd of only 11 people. Had the participant numbers been higher, it is possible that more pronounced and definite patterns would have emerged, just as in any other study.

Narrative Frames Analysis

The greatest strength of NFA is its ability to collect a large amount of data from many participants in a short time and with considerably less necessary resources than in-person interviews. The open-ended nature of the stems within the narration allowed participants to respond with a wider range of answers than would be possible in a multiple-choice style questionnaire. The narration itself prompted answers related to the theme of the research, allowing for a smooth stream of information related to all areas of interest.

However, some weaknesses of the narration were observed while analyzing the data. One area of concern in this study was the lack of theoretical premise, which made it unclear where conceptual categories come from and how they related to each other. This was a flaw that is attributable to the design of the study more than it is to any idiosyncratic feature of the NFA. Looking back through responses showed some gaps between concepts, or sections that demanded more depth than there actually was to the participant response. Career is not acknowledged; rather, only answers relevant to research interest are relevant.

One solution could be for participants to write down that they simply do not have an answer. It would be easy to write I am interested most in researching… nothing as a response to one of the prompts. Students in a graduate program might avoid acknowledging in writing a lack of interest in scholarly work. Regardless of the setting, situation, or context of the narration, participants might feel pressed to give more information than what might actually be pertinent to them. This could lead to erroneous answers written just to satisfy the perceived requirement of filling in all information. During the analysis, the researcher noted that many first responses garnered detailed responses, but a request for second responses such as *also, I... often* received much less output, and sometimes gave the appearance of a forced response.

In the creation and analysis of narrative frames for qualitative research, there is a lack of established procedure. Working without a framework or accepted form of standard measurement is difficult and time consuming during the creation process, but particularly troublesome while analyzing data. During the final stages of analysis, the researcher often attempted to parse out meaning through interpretation, particularly when interpreting intentions. This led to a process of attempting to understand how the narratives were interpreted by the writer. Absent any other data (such as a follow-up interview), the NFA results can be difficult to interpret.

Related to the previous point of a lack of framework for analysis, there was a tendency to over- rely on repeated instances. Although the same type of narration might be given multiple times, it does not make it important, only ubiquitous. Without being able to ask the participants follow-up questions to explicate upon the message, it would be very easy to miss important information that was related less often.

One critical point that was raised during the analysis process was the focus on in the text, when what was omitted might have been equally or more important. While the format of the narrative was less rigid than other standardized testing practices, it was rigid in its own way nonetheless. Without the interaction of an interview, the opportunity to redirect the questions based on the answers received was removed, and participants were forced to fit their answers to the prompts given.

Further Studies

Below are some suggestions for improvement in any future studies using NFA to research the same topic.

As this study illustrates, conducting a pilot study of the narrative tool after creation is necessary. Any gaps that appear trying to analyze the data may be addressed, and the instrument can be changed. Passages that produce ambiguous or off-topic answers can be re-written or removed.

Narrowing the theoretical focus of the narration to more specific themes might yield greater results. A narration that covers all aspects of one area will reveal richer data and provide deeper insights by having more diverse items that relate to the same topic.

In addition, a future study should expand the number of participants (e.g., 30). This would permit generalizability to apply in other contexts. Also, larger number of responses should provide unambiguous patterns and trends, if they exist.

Finally, conducting more follow-up interviews with participants after the narrative has been administered and analyzed would be beneficial to the study. This is perhaps the most difficult of all the suggestions, because it implies a prompt turn-around time between administration, classification, and analysis. However, this is a critical addition, as it removes the largest weakness from the NFA in its present form: a lack of clarification with the participants. This does not mean that a full interview necessarily needs to be conducted. The interview could focus on just particular points with a few select people, or in the form of a response group using key sections that need greater elaboration. It could also be an excellent time for participants to respond to and give feedback on researcher findings from the study.

Conclusion

The participants in the study offered key information related to the topic of interest, but also on the efficacy and implementation of NFA. The participants involved were found to be highly motivated educators that saw a postgraduate program as a chance for self-improvement, ultimately increasing their skills as instructors in the real world. Most were observed to have been highly affected during the completion of their graduate degree and by their experience working in the classroom.

Although narratives offer an alternative means to retrieve open information related to a particular topic from participants, there are weaknesses that need to be addressed if a more comprehensive picture is to be offered. The utility of such a device though, is in its ability to be administered to large numbers of participants in very little time. Including a narrative component with quantitative data could be viewed as a highly practical means of doing mixed-methods research in the future.

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Challenges in Practicing Intimacy and Maintaining Close Friendships Across Geographical Boundaries: A Study of International Students at Universiti Sains Malaysia

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Abstract

As friendship is a significant aspect of human nature, international students who study abroad are bound to experience a different social setting and might encounter changes in their friendship practices, especially with their close ones. Hence, the characteristics or qualities for maintaining close friendships despite being geographically separated and having limitations on practising intimacy were explored in this study. By using semi-structured in-depth interviews with 14 postgraduate international students from various countries studying at Universiti Sains Malaysia, the findings revealed several key elements that contribute to the formation of close friendships. These include trust, similarity, dependability, and support. Through a sociological lens, the study delved deeper into how these characteristics emerge from the participants' friendship experiences. This study also highlights the challenges of intimacy practices among international students in their long-distance close friendships. By examining how intimacy is understood and cultivated in these relationships across different cultures, the research provides valuable insights into the dynamics of maintaining close friendships during temporary periods of mobility abroad, as well as throughout one's lifetime.

Keywords: International Students, Characteristics, Intimacy Practices, Close Friendships, Geographically Separated

Introduction

International students are defined as those who have crossed the borders and are not citizens of the country in which they are studying or who have received prior education in another country (Organization for Economic Co-Operation and Development [OECD], 2013). Over the last decade, the influx of international mobility students has shaped the agendas of numerous higher education institutions, reflecting the global expansion of tertiary education systems (OCED, 2013). According to Padlee et al. (2010), the number of foreign students choosing Malaysia as their educational destination grows year after year. Moreover, in recent years, Malaysia has been chosen as the top study destination choice for international students furthering their studies based on several factors, such as a safe and secure environment, perceived cultural compatibility, a low cost of living, and low fees within the higher education system (Singh et al., 2014). Also, studying abroad enriches both students' academic and personal lives. Since the students come from different countries, they will have difficulties and struggle with many things, such as their studies, cross-cultural adaptation and adjustment, and maintaining their close friendship that has existed despite being geographically separated.

Moreover, the importance of having close friends, especially close co-national contact, become more influential over time as co-nationals are important for promoting cultural adjustment and managing stress (Geeraert et al., 2014), as well as providing emotional and practical assistance from people who have gone through similar transitions (Brown, 2009). This study will provide significant insights into friendship development among international students living overseas with their long-distance close friends and highlight the main characteristics of what makes the best friendship, hence making this study imperative. In addition, the purpose of this research is to investigate the importance of maintaining close friendships while temporarily residing in a foreign country, given that friendship depth and levels of commitment fluctuate over time (Becker et al., 2009). Thus, this study has highlighted some significant characteristics that lead to these complex friendships, which also help in retaining a good, close friendship while being far away from each other. Furthermore, Canary and Yum (2015) stated that friendships are typically thought of as 'weak ties,' which means that to maintain and preserve closeness, people engage in maintenance behaviours to keep their relationships stable. Thus, based on the previous statement, if people are unable to maintain friendship through communication, they will be at risk of losing that friendship, especially when they are geographically separated. Thus, this study also explores how international students perceive and practise intimacy, especially in their long-distance close friendships.

Method

Study Area

This qualitative study utilises semi-structured, in-depth interviews to collect crucial data. 14 postgraduate international students, including both master's and Ph.D. students from Universiti Sains Malaysia (USM), have participated in the study. According to Fernandez (2010), the reasons why students choose to attend USM are due to USM's strong business connections, good reputation, adequate facilities, and the availability of courses that meet the needs of its students. The researchers examine each participant's experiences, perspectives, values, and way of life to gain a deeper understanding of the study and its sociological implications.

Participants

This study included 14 international sojourners, seven males and seven females, all of whom were students at Universiti Sains Malaysia (USM). Participants must be between the ages of 20 and 33, as this is the average age for international students enrolling in universities. This study requires participants to study at USM for at least six months due to their experience adjusting to an unfamiliar environment, which would provide the researchers with a comprehensive understanding of the study. Table 1 provides a breakdown of the participants' demographic characteristics. To maintain the participants' anonymity, they were also assigned pseudonyms.

Table 1: Demographic Background of Participants

Name	Age	Sex	School	Home Country
Freya	25	Female	Pharmacy	Bangladesh
Bella	25	Female	Engineering	Iran
Lidya	32	Female	Accounting	Saudi Arabia
Maria	26	Female	Sustainability	Iran
Ursula	33	Female	Social Science	Pakistan
Maya	31	Female	Social Science	Indonesia
Rose	23	Female	Language	Indonesia
Ali	24	Male	Engineering	Saudi Arabia
Adam	24	Male	Accounting	Jordan
Jabbar	29	Male	Humanities	Iran
Tahar	32	Male	Physics	Yemen
Rizqi	27	Male	Social Science	Indonesia
Haamid	32	Male	Translation	Algeria
Arif	26	Male	Computer Science	Egypt

Sampling Method

Purposive sampling and snowball sampling are two sampling techniques used in this research study. Purposive sampling is based on the researcher's discretion in selecting the units to be studied (Rai & Thapa, 2015), while snowball sampling is used to generate a pool of participants by referring individuals who share a specific research interest characteristic with the target population (Crouse & Lowe, 2018). These methods have assisted researchers in identifying the required sample size for this study.

Research Instrument

This qualitative study used two research instruments to investigate the experiences of international students living temporarily abroad: friendship maps and semi-structured in-depth interviews. The friendship maps by Spencer and Pahl (2006) are used to gain a better understanding of the strength of close co-national friendship and the different types of interaction that occur between friends. Students will be asked to prepare a list of up to twenty names of co-national friends whom they consider to be close and important in their lives. The resulting maps serve as the foundation for the interviews. Furthermore, according to Holmes et al. (2015), interviews may provide more insights into emotional reflexivity because a researcher will gain a better understanding of emotions than through textual or document analysis. Several questions related to the topic and objectives of this study will be prepared in advance, and the students will be asked these questions in an unstructured semi-formal

interview. Open questions allow for the greatest amount of flexibility in acquiring new information and topics raised by students. The goals of the study are to identify close friendships, focus on the details of the close friends, and explore the meaning of close friendships based on the student's experiences.

Data Collection

This study used a friendship map and semi-structured in-depth interviews to collect data. 14 people were recruited via direct message and filled out an ethical consent form before the interview. Data collection took an hour and a half to ensure participants' comfort and confidentiality. Questions were developed to address the research objectives and additional inquiries were made during the interviews.

Data Analysis

Thematic analysis is a technique for organizing data based on shared properties or characteristics by identifying, analyzing, and reporting patterns within the data. This study utilized Braun and Clarke's (2006) six-step thematic analysis guide, which provides a straightforward and practical structure for conducting this type of analysis. Following data collection, all recorded interviews were manually transcribed and analyzed to identify and emphasis the initial themes. The recurring themes were identified and reviewed to ensure that the data had not been misinterpreted or that vital information had not been omitted. The findings are then presented and described in detail using direct quotes from interviews so that the researchers can relate them to sociological concepts and perspectives.

Results and Discussion

a) Characteristics or Qualities for Maintaining Close and Best Friendships

The major qualities that were crucial in maintaining close friendships include trust, dependability, and support as well as similarity which we will discuss further:

Trust

Nearly all of the major theories of interpersonal relationships are built on the concept of trust. Moreover, the concepts of trust and friendship are intertwined as developing a positive and well-maintained friendship requires trust. According to Simpson (2007), trust can be interpreted in several ways, and its relevance may change depending on the stage of relationship growth. As trust evolves as the result of disclosure (Fehr 2000), one must be comfortable with the person to disclose personal things. For example, one of the participants, Maria mentioned that trust is what makes her bond with her close friend:

> *The most personal things, I will always tell him. Even when I fight with my boyfriend, I will tell him. He will say whatever he wants to say because he knows the real me. (MARIA)*

Friendships appeared to become more intimate as the people involved became more open and comfortable with one another. Individuals discussed showing their 'true' selves to one another and engaging in more self-disclosure as time passed. This correlates with the study made by Wieselquist (2007) as the individual's perception of the friend's commitment would

mediate the relationship between a friend's report of commitment and an individual's trust in the friend. Thus, as trust develops and by sharing things reciprocally, they make their friendship intimate. Other participants, like Adam, classified all of his close friends based on their level of trust in him; that is, the more he trusted the person, the closer they were:

> *Actually, it is just about trust. The one that I feel comfortable with. The difference in the friendship circles is that I classified them based on trust. Like I do trust F1 more than the others. (ADAM)*

A study by Waris and Rafiq (2009) found that male same-sex friendships have less trust than women which is also supported by Faturochman et al. (2020) study on gender that revealed females were more trustworthy than males. However, in this study, it has been found that there is a positive correlation between friendship and trust for both genders. Prior to the study by Waris and Rafiq (2009), when it comes to same-sex friendships, male students learn to trust that they can rely on them for catharsis, emotional support, and relationship satisfaction during the most demanding developmental and career-building stages of their lives. Additionally, although Adam stated that he has only a small circle of close friends, for him the quality of friendship over its quantity matters, as Akin et al. (2016) stated a positive and significant relationship was found between friendship quality and subjective happiness. Another participant, Ali, also shed light on how trust is the main foundation that determined his current close friendships:

> *The first thing would be how trusting you are, how much you are trusting the person. Like some other friends when they are considered close, I had surgery one and half a year ago, two surgeries due to football injuries, and some people disappeared. Literally disappeared. So why we are thinking we are close? So, this situation shows you how you can trust people. Everyone on this list, I know that anytime or no matter what I go through even if we are not in contact, nothing is happening, you can trust him, depend on him, ask something so yeah. So, the first thing is trust. (ALI)*

All of Ali's close friends are someone that he puts his whole trust on as his friendships evolve. Furthermore, the persons' shared experiences provide accumulated proof that the other may be relied on, resulting in a sense of trust (Allan, 2011). Rebughini's (2011) astute understanding of the importance of friends being 'witnesses' to each other's emotions indicates a new dynamic in the creation of trust. Trust contributes to the emotional state of feeling valued and loved which in turn gives this particular relationship depth and significance. Hence, we believe that trust acts as the basis of friendship and plays a huge role in building close relationships with each other.

Dependability and Support

Having a close friend during tough times would undoubtedly help people cope because of the many roles that friends play as well as the support and well-being they provide. According to Sherbourne and Stewart (1991), social support can be classified into five categories: emotional (positive affect, empathic understanding); affectionate (display of love); informational (advice, guidance, feedback); tangible (practical aid); and good social contact (availability of others to do fun things together). Moreover, in a past study by Bakalım and Karçkay (2016), there is a positive correlation in the relationship between friendship quality and well-being through perceived social support as it contributes to psychological well-being as well as acts as a protective effect on mental health. This is clarified by the participants:

> *He is my support, he is everything so whatever it comes to me like difficulties or everything, I will contact him. (HAAMID)*

Haamid has emphasised that one of his close friendships is reliable enough that he can depend on him through the thick and thin of life. According to Almaatouq et al. (2016), reciprocated friendships are significantly more intimate and distinct from those that are not. Moreover, being able to physically comfort each other subtly through a remote but shared experience whenever a problem or feeling occurs (Octavia et al., 2007) has also been mentioned by some participants as how their close friends are dependable:

> *When you go to different countries, you will feel so many things, sometimes you feel disappointed and lifeless, and he was there. We always talk to each other, and we can talk from 10 pm to 3 am about what has happened in previous semesters, etc. (ALI)*

> *F2 is a good listener. He always gives good solutions for me when I tell my problems to him. (RIZQI)*

> *Well to have a close friend means you have shared interest, shared values, and yeah showing up when he/she needs helps. I guess that's how it is for me. It's like when you form friendships, that is your support system. So yeah, it's like, sometimes you need to depend on those people to get things through. (ARIF)*

Dependability can come in various ways, such as one can be dependable by giving help and support physically and emotionally. Hence, whenever problems arise or they need someone to listen to Rizqi and Ali will turn to their close friends as they will attentively listen and come up with good solutions. Meanwhile, Arif has disclosed that his friendships are his support system, and he can depend on them when things get rough. Eker, Arkar, and Yaldz (2001) mentioned that social support networks may provide emotional comfort, assist with problem-solving by offering advice, provide vital feedback that improves performance, encourage personal growth, and shield individuals from the adverse consequences of stress. Additionally, throughout this study, it is found that when dealing with stress, the majority of research participants seek help from their social network or their close ones. This shows that social connection is associated with the support that people give and receive from one another, which also has a positive impact on one's health, mood, and sense of belonging (Doroszuk et al., 2019). Ali has also further enlightened the researchers about how his friendship arose with another good friend:

> *He is the guy who has lost his father in a very long time so most of the time he depends on himself so when he needs something, I will be there for him back then. For example, when he is involved in a car accident, I will be the one he calls and if I am facing some financial issues back there, he will be the one I call. If he was facing something at one time back then, he was not with his identification card and the police took him so I was the first one that he would call and go get him, settle the things so yeah. So, when he was in trouble, finding something I would be there for him, and when I was in trouble he would be there. (ALI)*

Close friends continue to be important companions and sources of support for older adults, despite the fact that friendships vary in terms of quality and stability. (Carstensen, 2006). This was demonstrated by Ali's friendship with his close ones, on which they could rely and

provide instrumental as well as emotional support for one another, as providing and receiving support strengthens and extends relationships (Doroszuk et al., 2019).

Similarity

A notable study on homophily and friendship by Kandel (1978) indicates that homogenous behaviors and attitudes influence interpersonal attraction that sustains friendship ties. Moreover, the increasing social isolation in which independent adults with high levels of homophily are unlikely to form an intimate relationship (McPherson et. al. 2006). One of the excerpts taken from the recording demonstrated how sharing sameness for each other bonds them to be closer:

> *We go out, we are so similar to each other like you know, we would like to do activities together. I share the same interest, same character, with her as we are born in the same month too. (MARIA)*

Maria elaborated that this close friend of hers is similar to her as they share the same interests and often do activities together. This is supported by Lawrence and Shah (2020), as their individual preferences explanation of homophilous behavior suggests that, given options, individuals will choose people who are similar to them. Moreover, as mentioned above, individual characteristics also play a role in the frequency with whom they form friendships by facilitating subsequent interactions and the development of the friendship. Hence, homophily in friend selection is said to reinforce an individual's personal identity through a shared "sameness" (Allan, 2010). Both participants, Haamid and Tahar, mentioned how their similarity has grown their friendship to be more intimate:

> *Actually, for F1 he is someone who understands me, and I understand him. It is like we are the same. We have the same perspectives, the same personality, and the same thinking. Although of course, it is not the same 100% but similar. (HAAMID)*

> *I think because we have the same interest, and I don't know but I think I have this interest towards these IT people because he also does IT like F1. Also, we have so many things in common like he likes to think he is a thinker. He is a smart guy although people don't like the way he thinks but I think he has logic, and it makes sense to me. So, I like to discuss things I love people who discuss things with me and do negotiations until we reach a conclusion. I love stuff like that. Critical thinkers. (TAHAR)*

According to Haamid, his close friend (F1) is like a nearly perfect reflection of him. Meanwhile, according to Tahar, the same interest connects him with his close friend. This is intricately related to the concept of Kandel's (1978) study of homophily and friendship, which indicates that the interpersonal attraction that sustains the friendship tie influences homophilous behavior and attitudes. Other participants, like Rose and Jabbar, also share the same highly participative interest with their close friends.

> *We came across with the same interest and we also kind of bonded through our school days. Back in the day, there were group projects and those kinds of things so at first, we kind of bonded through that and later both of us found out that we share the same interest, particularly in music. We shared the same idols and also played the same game. I am very comfortable with her. (ROSE)*

Additionally, homophily also occurs more in similar people who share the same interests rather than dissimilar people. As such, according to Mcpherson (2001), the patterns of homophily tend to get stronger as more types of relationships exist between two people, indicating that homophily in each type of relationship cumulates to generate greater homophily for multiplex than simplex ties. International students thus encounter a variety of difficulties in maintaining their co-national friends while temporarily residing abroad. However, by contacting each other and having the main qualities that make the friendship close, long-distance close friendships can be maintained. Based on the result above, some of the reasons that can be highlighted on why some people are considered special and close to a particular person is due to the trust gained, dependability, and similarity as well as the memories that they have shared with these people have which make them close.

b) Practicing Close Friendship

Throughout the interview, all of the participants, still seek and connect with their close established friends who are not in Malaysia. The established close friends of theirs are majorly co-national and live in their country. People's interaction patterns have shifted as a result of modern (communication) technologies as they have made it easier to maintain relationships across long distances (Utz, 2007). Moreover, the frequency of them keeping in touch depends on how they practice their intimacy. Since they are geographically distant, their ways of contacting each other are mostly through the use of media, including calls, video calls, texting, and a variety of social media platforms (Instagram, Snapchat, etc.). Research by Huq (2020) has unrevealed that the most popular digital technology used to keep connected to long-distance childhood friends was social media such as Facebook, and instant messaging such as WhatsApp. For instance, we can see that one of the participants, Haamid mentioned that he frequently contacts his close friend through texting, and it has been a daily habit for them:

> *When it comes to me and him, it is just us. We do not care. Like now in Malaysia, we are talking daily. 1 hour ago, he was texting me and whenever he woke up, he would text me first. Like it is a daily thing. (HAAMID)*

According to Carbonaro and Workman (2013), the amount of shared social interaction between friends determines the closeness of friendship since the more time friends spend interacting with one another, the more information is received and maintained in the 'relationship system'. Also, sharing problems and feelings between friends who live far away from each other is crucial in maintaining the relationship (Octavia et al., 2007). Furthermore, when being asked about the things they talk about, Lidya mentioned that she usually talks about normal things, being concerned about each other:

> *When I use social media to contact them, it is just to ask about each other because I am living alone here so they always like you know, think about me like if I need anything or if I am sick. Most of the time, to be honest, we just share some famous videos, TikTok videos and yeah sometimes we just share it between us and talk about that. Not really to have like something to talk about but just sharing and like "Have you seen this" and just like that. More like remembering them when I saw the video. (LIDYA)*

Additionally, with the rise in usage of social media such as TikTok, Lidya and her close friends customarily share videos. For Lidya, sharing those videos is how she conveys her

remembrance of them. Although some might view it as a simple act those simple acts are considered as little things that help the relationship (which in this case, friendship) grow fonder for each other. LifeWork (2020) stated that sharing photos or videos with friends and others on sites and committing to having regular phone chats with the people who care about them can help maintain long-distance friendships. Furthermore, Haamid also mentioned that social media helps him enrich his communication when he is far away:

> *In social media, recently we have been talking about the pandemic situation and the work. They will be asking "When you will come back?" or "When you will get married?". For my brother (F2) he will want to gossip and what am I doing in Malaysia like do I have a girlfriend or do I meet with girls, these things. He is just crazy (laughs). If I meet face to face with my close friends, we will share a lot of experiences like the struggle. For example, when I sit with F3, he will start sharing the problems and we will find the solution. It is like random topics, that suddenly happen. Just go with the flow. (HAAMID)*

Haamid also stated that his communication with his close friends started with random topics and flowed into something deeper where he would listen and find solutions to the problems and the things that have shared. Additionally, although it has been reported by Strikwerda and May (2012) that due to the social construct, most males have less complex emotional responses to situations than females, this study however found that males can also be emotionally open to finding comfort which has been expressed by Haamid and his close friend. On the other hand, some participants like Rose and Maria do feel relieved with the existence of social media but they do not feel fully satisfied and feel the full presence when contacting with each other:

> *When I contact them using social media, it feels a bit sad because I cannot do physical interaction but at the same time, I also feel relieved that I live in a generation that has social media as it is kind of like a platform to stay connected to those who are far away from you. So, I would say that I rely on social media to contact them a lot especially the ones who are not studying in Malaysia, long-distance friends. But I do not think social media is enough for me, I like being face to face, and enjoying each other presence, I like that kind of interaction. I would choose face-to-face more. (ROSE)*

> *For social media, sometimes I feel that they should be closer to me and not in social media. Like come, be here. When face-to-face with them I feel very happy. Very, very satisfied. (MARIA)*

Rose and Maria have highlighted the inability to perceive the other person's 'true' presence as one of the major drawbacks of online interactions. Online communication has a negative impact on the perceived quality of life due to the lack of nonverbal cues, a lack of warmth, and a lower demand for engagement (Lee et al., 2011). Due to insufficient nonverbal cues, a lack of physical interaction, and insufficient time spent together, their friendship is not as fulfilling as it once was. Face-to-face communication has been cited by each participant as the most effective method for maintaining intimacy and fostering connection. Most of them are geographically separated, so they acknowledge that social media helps them strengthen their social connections with their closest co-national friends. Therefore, we can conclude that social media plays a significant role in connecting long-distance friendships, but nothing beats face-to-face interaction. This study provides insight into the intimacy practises between

co-national friendships, which assist individuals in feeling at home and connected, as well as in adjusting to their new surroundings.

Conclusion

This study examines the importance of friendship and life satisfaction for international students living temporarily abroad. It conducted online in-depth case interviews with fourteen international students (seven males and seven females) to examine the significance of instrumental and emotional support required, particularly the support from their close co-national friends when living abroad. The study highlighted the overall and main qualities that make up a good friendship, which include trust, similarity, and dependability, as well as support. The study also found that there are some other characteristics and qualities that make up a good friendship, such as trust, similarity, and dependability, as well as support. This study found that there are no significant differences between males' and females' main characteristics in what makes a good and close friendship.

Support is also necessary for the lives of international students to maintain close friendships with their co-national friends back home. This study also highlights that communication technologies have been demonstrated to be the primary means by which long-distance friends maintain relationships with one another. The participants emphasised that they were grateful to be able to connect through mediated communication, but they preferred face-to-face communication the most as they felt a sense of 'presence.' The study was able to identify the important characteristics that play important roles in overcoming friendship distance. It can be useful for international students to improve their lives while studying temporarily abroad by preventing friendships from dissolving in education as it encompasses shifts in both physical and mental health. As with every study, this one also has several limitations. The study was carried out only in the context of Universiti Sains Malaysia. In the future, this research must be replicated with a different and larger sample area that encompasses the whole of Malaysia. More research is recommended and needed to determine whether there are differences in the major qualities of friendship—trust, dependability, and support as well as similarities between both sexes.

Acknowledgements

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The Impact of Teachers' Professional Collaboration in Taiwan: Application of the Talis 2018 Junior High School Teacher's Database

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Abstract

According to the Organization for Economic Co-operation and Development (OECD), professional collaboration is an essential support tool for teachers working in challenging environments. It has been identified as one of the five pillars of teacher professionalism. Scholars have indicated that professional collaboration among teachers is one of the essential directions of current educational reform. This study conducted a multi-level analysis using Hierarchical Linear Modeling (HLM) to examine the factors influencing teachers' professional collaboration. The findings indicate the following. (1) Teachers' self-efficacy did not have a significant effect on professional collaboration; (2) The higher teachers' awareness of teaching beliefs, the more willing they were to collaborate professionally; (3) Teachers' job satisfaction did not have a significant effect on professional collaboration; (4) Teachers' difficulty in collaborating professionally was due to busy work schedules, family responsibilities, and a lack of incentives; (5) The higher the teachers' innovative teaching climate, the more willing they were to collaborate professionally; (6) Teachers prioritize teacher-student relationships, which have a significant positive impact on professional collaboration among teachers; (7) Professional development activities negatively impacted professional collaboration, as teachers were more likely to participate in their own independent qualification programs (degree programs). The study concludes with recommendations to facilitate and promote professional collaboration among teachers.

Keywords: Job Satisfaction, Teacher Self-Efficacy, Teacher Professional Collaboration, Teaching Belief, Teaching and Learning International Survey (Talis)

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Introduction

Educational reform relies on teacher interaction and cooperation to achieve educational tasks and goals (Brownell et al., 1997). Professional collaboration among teachers has recently been regarded as an essential direction of educational reform (Morse, 2000). According to the Organization for Economic Co-operation and Development (OECD) (2020), professional collaboration is essential to support teachers to work in challenging environments. It has been identified as one of the five pillars of teacher professionalism. This is because a teacher's work is holistic and dynamic, and teachers often teach students with varying abilities and learning styles. Therefore, teachers require feedback and support, and the relationships and interactions between teachers and colleagues are significant. Teachers can also learn from each other through professional collaboration, including sharing their professional knowledge and learning from each other's teaching experiences via professional learning communities; this ultimately improves the quality of teaching and enhances student learning effectiveness (OECD, 2020). Therefore, professional collaboration provides teachers with more learning opportunities and supports teachers in coping with the challenges and complexity of teaching (Darling-Hammond, 2010).

The Teaching and Learning International Survey

In the Teaching and Learning International Survey (TALIS) 2013, countries such as Finland, Canada, and Singapore were identified as the top performers. Their common feature is a high degree of professional collaboration among teachers (Schleicher, 2016). Teaching is a multifaceted profession. If teachers are encouraged to engage in professional practice inquiry in addition to their teaching role, they can take ownership of their work holistically (Ainley & Carstens, 2018). Therefore, the TALIS focuses on collaboration as a teacher's professional practice; it also examines the role of collaboration in teacher professional development and innovative teaching (Ainley & Carstens, 2018). In a collaborative professional work environment, teachers create a collective force that initiates and sustains continual improvement in their professional practice so that each student they teach receives the highest quality of education possible (Pugach & Johnson, 2002). Empirical studies indicate a positive impact of teachers' professional collaboration on student achievement (Chen et al., 2018), linkages with teachers' beliefs about teaching (Sannen et al., 2021), and the promotion of school success (Garcia-Martinez et al., 2021). Such findings suggest the positive impact of teacher professional collaboration. However, there is a lack of research exploring what factors facilitate teachers' professional collaboration. A clear understanding of the factors affecting teachers' professional collaboration will help to encourage and promote it to ensure teaching quality and student learning.

Based on the above, the importance of professional collaboration among teachers is evident. However, it is often challenging for teachers to collaborate professionally because, under the educational sector's current system, teachers are likely to run their classrooms in a kingly manner. Teachers are accustomed to a culture of independent teaching and learning and a preference for personal autonomy, making collaborative activities among teachers less desirable (Somech, 2008). Although teachers are aware of the positive impact of professional collaboration on teaching quality and student learning outcomes, they still rarely engage in professional collaboration. For instance, Schaffhauser (2018) found that 44% of teachers did not go to another classroom to obtain ideas for teaching or observe feedback. Furthermore, the findings indicate that only 38% of teachers were willing to engage in a collaborative activity; the rest of the teachers never shared their teaching experiences or classroom

innovative content with other teachers. Johnson (2003) suggests that teachers are negative and reluctant to collaborate because they perceive that it leads to increased workload and a loss of pedagogical autonomy. Yet, teacher professional collaboration is an essential component of educators' professional development. However, teachers primarily tend to work in isolation and autonomously (Schaffhauser, 2018). Therefore, the present study conducted an in-depth discussion on the factors that may affect teacher professional collaboration.

Professional collaboration includes a wide range of school activities (Goddard et al., 2007). It can be presented in various forms, including peer sharing, professional learning communities, teacher teams, and professional networks (Vangrieken et al., 2015). Question 33 in the TALIS 2018 survey comprised the Professional Collaboration Questionnaire, including four questions on "Collaborative Teaching," "Observational Learning," "Cross-Classroom Teaching," and "Participating in the Community." According to the TALIS 2018 results, the percentages of Taiwan's junior high school teachers who answered 'never' and 'once a year or less' for the four questions on professional collaboration activities were 79.8%, 52.8%, 70.2%, and 30.1%, respectively. This reflects that more than half of the teachers seldom participated in professional collaboration activities. Hence, the influencing factors behind this phenomenon should be further explored. The present study used the results of the Teaching and Learning International Survey (TALIS 2018) conducted by OECD in 2018 for secondary database analysis. We conducted a multilevel analysis through Hierarchical Linear Modeling (HLM) to identify the factors affecting teachers' professional collaboration. This study's results can help provide a reference for promoting teachers' professional collaboration in Taiwan.

Conclusion

1. Conclusion

The present study focused on Taiwan junior high school teachers in the TALIS 2018 survey to explore potential factors influencing professional collaboration. After conducting analysis and discussion, the following conclusions can be put forward.

(1)   Teacher self-efficacy does not significantly impact professional collaboration.

This finding suggests that self-efficacy alone cannot influence teachers' performance in professional collaboration. Furthermore, the descriptive analysis of the self-efficacy items indicates that Taiwan junior high school teachers tend to be overly focused on classroom discipline and rules, which can decrease their willingness to engage in professional collaboration. Teachers paying more attention to "instructional practices" and "student engagement" may promote professional collaboration.

(2)   Teacher teaching beliefs significantly positively impact professional collaboration.

The results of the present study indicate that when teachers perceive a higher degree of teaching beliefs, their willingness to engage in professional collaboration also increases. Furthermore, the descriptive analysis of the teaching beliefs items shows that when teachers predominantly hold "constructivist teaching" as their teaching belief, their willingness to engage in professional collaboration is greater. Thus, teachers with student-centered teaching beliefs are more likely to recognize that professional collaboration positively impacts

teaching and are more inclined to actively engage in professional collaboration with other teachers. Conversely, if teachers hold a teacher-centered "direct instruction" belief, it may decrease their willingness to engage in professional collaboration.

(3) Teacher job satisfaction does not significantly impact professional collaboration.

This finding suggests that teacher job satisfaction cannot independently influence teacher performance in professional collaboration. Furthermore, the descriptive analysis of the job satisfaction items shows that "all in all, I am satisfied with my job" and "I enjoy working at this school" received the highest scores among the four job satisfaction items. Furthermore, "I would like to change to another school if possible" received the lowest score, indicating that most junior high school teachers in Taiwan are satisfied with their current school jobs. However, the fact that teacher job satisfaction cannot influence teacher performance in professional collaboration may be due to the tendency for teachers in Taiwan to work independently, which could explain the higher job satisfaction levels.

(4) The barriers to participating in professional development activities significantly negatively impact professional collaboration.

This study's findings suggest that the greater the barriers to participation, the lower the willingness to engage in professional collaboration. Moreover, teachers' challenges engaging in professional collaboration activities are directly related to barriers to participating in professional development activities, such as high work stress, heavy family responsibilities, and a lack of incentives and school support.

(5) Teaching innovation has a significant positive impact on teacher professional collaboration.

This finding indicates that when teachers perceive a higher innovative teaching climate, their willingness to engage in professional collaboration increases. Furthermore, if a school fosters an innovative teaching environment, it can enhance the impact of teachers' perceived professional collaboration on teaching. Therefore, creating an innovative and open teaching environment allows teachers to be in a trusting atmosphere of mutual learning; they can become advisors to each other, thereby promoting professional collaboration among teachers.

(6) Teacher-student relationships significantly positively impact teacher professional collaboration.

The findings of this study indicate that when teachers perceive a better teacher-student relationship, their level of professional collaboration is also higher. Furthermore, the descriptive analysis of the teacher-student relationship items shows that the average scores for "most teachers believe that the students' well-being is important" and "teachers and students usually get on well with each other" were the highest among the four teacher-student relationships items. This result indicates that most junior high school teachers in Taiwan emphasize student well-being and maintaining positive relationships with their students. Therefore, when teachers prioritize student well-being, their willingness to engage in professional collaboration is higher because collaboration can lead to better student learning outcomes.

(7) Professional development activities significantly negatively impact teachers' professional collaboration.

This study's findings indicate that the more teachers participate in professional development activities, the lower their willingness to engage in professional collaboration. The study results suggest that most junior high school teachers in Taiwan participate in activities related to qualification and certification courses, graduate degree programs, and visiting school organizations. These types of professional development activities are typically pursued independently by individual teachers. However, participation in face-to-face physical courses that require professional collaboration among teachers is comparatively minimal.

2. Recommendations

(1) Encouraging teachers to collaborate on teaching is a method to enhance "instructional practices" and "student engagement".

This study's research findings indicate that teachers' excessive focus on classroom discipline and rules makes them less willing to collaborate professionally. Therefore, we recommend that teachers should incorporate diverse teaching and assessment strategies in their classrooms to help students prioritize learning and facilitate critical thinking. Additionally, they should avoid investing excessive effort in controlling disruptive behaviors in the classroom and enforcing classroom rules.

(2) Encouraging teachers to engage in critical thinking and group instruction can help establish a professional collaborative belief in constructivist teaching.

The research findings indicate that teachers engaged in professional collaboration predominantly hold constructivist teaching beliefs. Therefore, we recommend that teachers assign tasks in the classroom that require students to engage in critical thinking and encourage them to work together in groups to find solutions to problems. Additionally, allowing students to independently determine the steps to solve complex tasks can help establish a professional collaborative belief in constructivist teaching.

(3) Guiding teachers in balancing their family and work responsibilities can reduce barriers to participating in professional development activities.

The research findings suggest that teachers' reluctance to engage in professional collaboration is influenced by factors such as heavy workloads, excessive family responsibilities, and a lack of incentives for participating in professional development. Therefore, we recommend that schools reduce teacher workload stress and provide support and encouragement to teachers, making them more willing to engage in professional collaboration. Additionally, schools should emphasize the value of participating in professional development to enhance both intrinsic and extrinsic motivations for teachers.

(4) Creating an atmosphere conducive to teaching innovation within schools can positively impact instruction.

Schools should encourage teachers to continually innovate in their teaching environments and provide opportunities for instructional innovation activities. Teachers who are part of an

innovative teaching culture are more inclined to collaborate professionally and collaborate with peers to create innovative teaching content, thereby enhancing instructional quality.

(5)   Establishing professional development communities for teachers and promoting collaborative professional collaboration training can be beneficial.

The research findings indicate that teachers are more inclined to participate in individual activities such as certification courses, degree programs, school visits, and online courses, which may reduce their willingness to engage in professional collaboration. Therefore, we recommend that schools organize in-person courses, seminars, and teacher professional communities that require teachers to collaborate professionally.

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Investment in Social Science Education and Its Worthwhile Wage

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Abstract
Investing in education is a type of capital accumulation in humans. The value of money spent or accumulated in humans from birth to graduation is called human capital. Therefore, being a company employee is like investing in capital equal to the amount of human capital accumulated in that company. Wage or salary earned by a company is also like a return on investment. This research aims to find out what wages we earn each month after graduation and whether it is worth the human capital in us or not. What should be the wage rate worth investing in? This research uses secondary data from the National Statistical Office of Thailand and other related data sources. This research focuses on the study of social sciences in 5 majors of bachelor degrees including Communication arts major, Account major, Law major, Economics major, and Business management major. The findings showed that, in the year 2022, the initial wage rate of new graduates in the five fields of social sciences in Thailand is not worth their human capital invested from birth to graduation. Preliminary suggestions from this research are as follows: The government should implement a policy to improve the quality of education to increase graduate productivity. The higher graduate competencies and skills will result in employers willing to pay wages at a higher rate. The government should implement a policy to encourage new graduates to conduct their own business to raise their income higher than being an employee.

Keywords: Education, Social Science, Investment, Worthwhile Wage

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Introduction

Globalization and borderless competition under today's capitalist system have important influences on management in every sector, whether it be businesses, state enterprises, or even government agencies. Human resource management is more important than in the past because it is generally accepted that organizations can survive in today's changing environment. This is because those organizations have qualified personnel who can drive the various missions of the organization to achieve its goals (Kitti Meelamian, 2016:149) Human resources are the most important management resource because they are the resource that can create value and add value. It can learn and enhance skills in thought and action. It can drive the organization's mission to achieve its objectives. People are similar to human capital from the aforementioned perspective. Therefore, education is an important factor in developing human resources to have better quality or increase the value of human capital. Studying the ideas of economist Adam Smith (1976), he opined that education is an investment. He stated in his book The Wealth of Nations that investing in education is a matter of human resource development and causes each person to have different abilities.

Investing in education is like investing in any other project where the returns and costs of the project must be considered. Calculating the economic rate of return on investment in education involves both the economic rate of return that benefits society and the rate of economic return that benefits individuals. The personal rate of return is the return that accrues to the learner based on the cost that the learner must pay for the course and upon completion of the course. Graduates will receive a salary, wages, or other benefits including fame, honor, and respect from society.

Investing in education is an important issue that the research team is interested in studying whether investing in education in the social sciences at the higher level with a bachelor's degree and receiving a salary is currently worth the investment in education. If it's not worth it, we'll offer guidelines on how much salary you'll need to earn to make it worth it or have other options to adapt to survive in the current economic situation.

Literature Review

Becker (1964) researched the measurement of economic returns or increased income (monetary terms). This increase in income reflects increased labor productivity. Investing in education can result in people having more knowledge and skills to earn higher incomes.

George Psacharopoulos (1981) researched Returns to Education: An Updated International Comparison. He found that higher levels of education were due to higher investment in education. Therefore, it had a greater effect on increased income. It revealed that investment in education affected the value creation of human capital. However, human capital is one factor that plays an important role in economic development and has an effect on increasing national income. In studying the role of human capital, related theories such as Endogenous Growth Theory are developed from Neoclassical Growth Theory. Robert Solow and Trevor Swan once said that investing in people through investing in education creates value in people with knowledge, abilities, and skills.

Harry Anthony Patrinos and George Psacharopoulos (2004) researched Returns to Investment in Education: A Further Update They found that the personal rate of return for bachelor's degree graduates was higher than that of high school graduates by 10.48 percent for males

and 9.50 percent for females. The rate of return for tertiary graduates ranged from 8.0% to 12.8% per year for males. Females had a rate of return between 4.5 and 7.9 percent per year. Higher education also had an impact on long-term economic growth.

Sasiwimon Warunsiri and Robert McNown (2010) researched The Returns to Education in Thailand: A Pseudo-Panel Approach They developed an econometric equation whereby income varies with years of education and age or work experience. The study found that the rate of return on investment in education was approximately 14-16% per year, female workers earned higher than male workers, urban workers earned higher than rural workers, and single workers earned higher incomes than married workers.

Panadda Bunchad (2001) researched the rate of return on investment in education from the perception of Chulalongkorn University graduates and their decision to pursue graduate studies. When comparing the rate of return from realization with the rate of return from other financial investments, graduates have a realized rate of return that is higher than the interest rate from all forms of financial investment, including short-term, medium-term, and long-term government bond investments including depositing money with commercial banks, both savings and fixed deposits. It revealed that graduates perceive education as a high-return investment that is more worthwhile than other financial investments.

Thoedsak Chomtohsuwan (2016) researched a study of the relationship between human capital returns and education: a case study of Thailand. He found that if workers invest in higher education, they will accumulate more total human capital and receive a higher rate of return on human capital. In addition, research studies have found that investing in different fields of study yields different rates of return. Choosing to invest in different subjects comes from many factors such as family, capital, physical condition, intellectual abilities, distance from educational institutions, and access to educational and work information, etc. However, an individual's decision to choose a field of labor may not depend solely on monetary rewards but may also depend on personal tastes and preferences that derive pleasure from passionate work.

Objectives

This research paper aims to study the cost of education in the social sciences of the Thai population and the rate of return that is worth investing in social science education in Thailand.

Methodology

Hypothesis

To estimate the value of human capital, employment earnings, and rates of return on investment, this research makes the following necessary research hypothesis:
- ✓ To determine the consumption patterns of each generation of the population are not significantly different.
- ✓ To determine that each citizen in the same age group has the same basic daily expenses.
- ✓ To determine the population continuing to study from kindergarten until the highest level of education is completed at the bachelor's degree level at the age of 22 years old.

✓ To determine the population that starts working after graduation at the age of 23 years old.
✓ To define each population working in accordance with their level of education and field of study.
✓ To determine those citizens with the same educational qualifications receive the same rewards from work during the first year of work.
✓ To determine the year 2022 as the base year for calculation.

Sources

This research collects secondary data from the following sources:
✓ Information on the daily spending of the Thai population from the Household Socio-Economic Survey (SES) of the National Statistical Office.
✓ Information on work compensation for new graduates from universities, Thai government, and private agencies.
✓ Information on tuition fees and expenses related to education from Thai public and private educational institutions.
✓ Information from various related research studies.

Analysis

This research divided the sample group into graduates from 5 groups of social science subjects as follows:
✓ Communication arts major
✓ Law major
✓ Economics major
✓ Account major
✓ Business management major

This research analyzed the value of money from investing in education based on the rate of return on human capital which is calculated by comparing the net return value that graduates from each field of study receive from their first year of work compared to the value of the human capital of graduates from that field of study. According to the following equation:

$$\Omega_k = \left(\frac{\lambda_k}{HC_k} \right) \; x \; 100\%$$

$$\lambda_k = Rsl_k + Rad_k - \delta_i$$

$$HC_k = \sum_{i=0}^{22} \left[\delta_i + \varepsilon_i + \gamma_i \right]$$

$$\delta_i = \theta_i \, \mu_i$$

Whereas Ω is the rate of return on human capital (percentage per year), λ is the net return from work (baht), Rsl is salary (baht), Rad is a bonus (baht), HC is human capital (baht), δ is basic living expenses (baht), θ is the proportion of basic consumption expenses, μ is the total

expenses (baht), ε is the cost of education (baht), γ is the opportunity cost (baht), k is the bachelor degree field, i is the age range (years).

However, the net compensation value is the income after deducting basic living expenses during the working year. The income that graduates from each field of study receive from their first year of work is estimated from two main methods: salary and bonuses.

Human Capital is estimated from a person's various expenses for 22 years, accumulated from the time he was in the womb until he graduated with a bachelor's degree. Expenses consist of 3 main parts: basic living expenses, education expenses, and opportunity costs from choosing to continue education at the high school and bachelor's level without working for 15-22 years.

Results

Results of research on the worthiness of investing in social science education in 5 fields of study for Thai people born in the year 2000. The researcher began studying the sample at the age of 4 years old in a kindergarten for 3 years, continued with a primary school for 6 years, continued with a secondary school for 6 years, and continued with a bachelor degree for 4 years and graduated with a bachelor degree in the year 2021 at the age of 22 years old and began working in the year 2022 at the age of 23 years old. The results of calculating the financial value in each age period use a value equivalent to the value in the year 2022 (Constant price 2022) at the exchange rate of the baht to the United States dollar equal to 35.0316 Baht per USD.

This research found that basic living expenses in each age group are different. It tends to increase continuously with increasing age, from 1,004.43 USD per year to 2,590.90 USD per year at constant prices in the year 2022 and the value is adjusted according to the annual inflation rate in Thailand, which fluctuates between -0.9% and -6.08%, as shown in Figure 1.
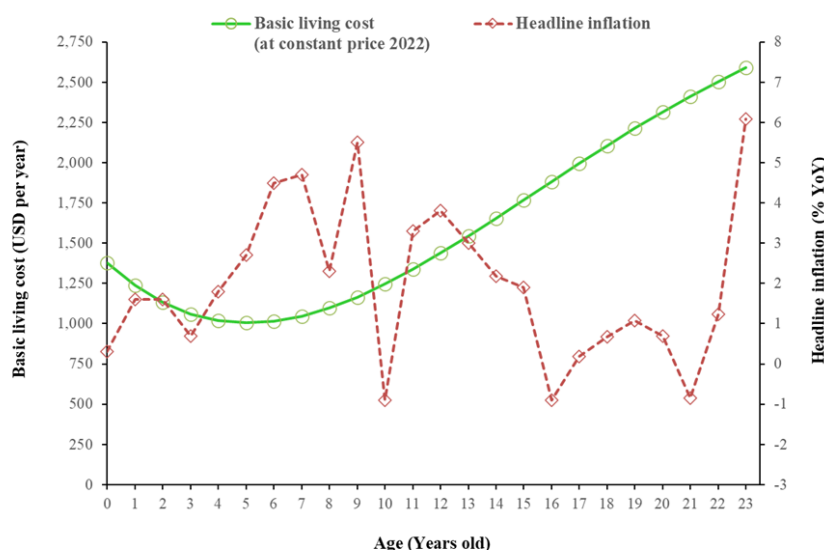
Figure 1: Inflation rates and basic living expenses of the Thai population
from 1999 – 2022 (at constant prices in 2022)

The value of investing in education from birth until graduation in 5 social science fields is approximately the same, on average approximately 100,284.57 USD. The field of study with

the highest investment value is Communication arts major with an investment value of 101,066.10 USD, followed by Account major with an investment value of 100,265.31 USD, Law major with an investment value of 100,258.68 USD, Economics major with an investment value of 100,019.93 USD, respectively. Business management major has the lowest investment value: 99,812.85 USD. The average basic living expenses of each occupation is approximately 37.18% of annual income, as shown in Figure 2.
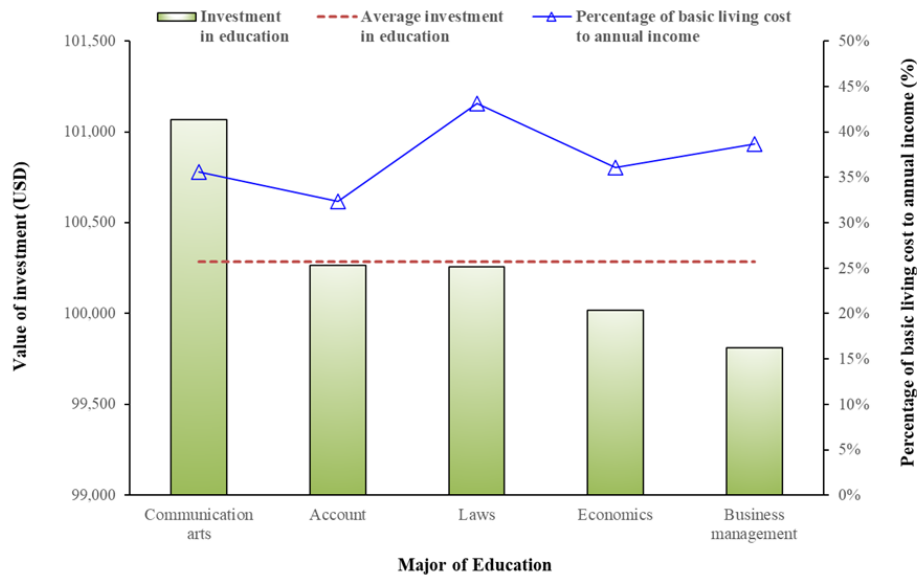
Figure 2: Value of investment in social science education and
percentage of basic living expenses to annual income

In summary, during the first year of work, all 5 majors had an average salary of approximately 540.95 USD per month. Account major graduates earn the highest salary at 615.85 USD per month, followed by Communication arts major at 559.45 USD per month, Economics major at 551.74 USD per month, and Business management major at 515.32 USD per month. The Law major has the lowest salary of 462.40 USD per month. Social science careers have extra income and/or bonuses averaging approximately 1 time of the salary per year. The annual income of each occupation is slightly higher than the income from a regular salary. But when subtracting the basic living expenses, the net return from working during the first year decreases significantly.

Investing in social science education has an average first-year financial return of approximately 4.43% per year. The field of study with the highest financial rate of return was Account major at 5.40% per year, followed by Communication arts major at 4.63% per year, Economics major at 4.58% per year, and Business management major at 4.12% per year, respectively. The lowest financial rate of return is Law major at 3.41% per year, as shown in Figure 3. The financial returns from investing in the five social sciences studies above are still low when compared to the returns from better investment options.
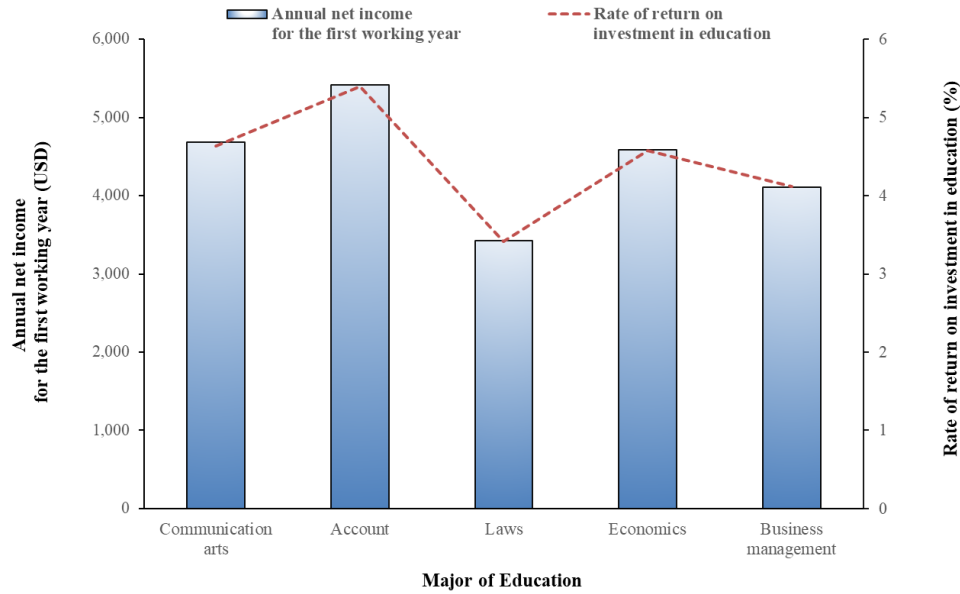
Figure 3: Net compensation and rate of return from the first year of work
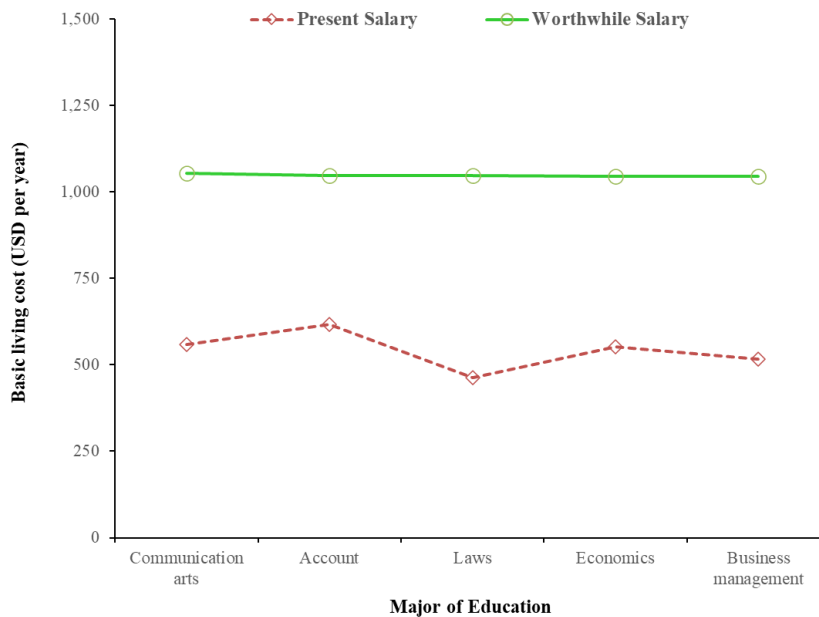
Figure 4: Current salary rates in 2022 with salary rates worth the investment

This research found that investing in S&P500 stocks has an average Minimum Acceptable Rate of Returns (MARR) of approximately 11% per year. If the said rate of return of 11% per year is used as a criterion for the rate of return that is worth investing in social science studies or the appropriate rate of investment, it is found that the appropriate salary for the fields of Communication arts major, Account major, Law major, Economics major, and Business management major are: 1,054.47 USD, 1,047.70 USD, 1,047.64 USD, 1,045.62 USD, and 1,043.87 USD, respectively and averages approximately at 1,047.86 USD. The actual salary rates in 2022 for Communication arts major, Account major, Law major, Economics major, and Business management major occupations in Thailand compared to the appropriate salary rates are still only 46.95%, 55.86%, 47.23%, 41.22%, 50.63% or approximately 48.38%.

Conclusion: Summary and Discussion

This research found that social science careers in 5 majors in Thailand in the year 2022, including Communication arts major, Account major, Law major, Economics major, and Business management major receive an average salary in the first year of employment of approximately 540.95 USD per month, or approximately 4.43% per year. It is still not worth investing in each major with an average investment value of approximately 100,284.57 USD.

When comparing the average salary rate of new graduates in the first year of work in the year 2022 in other countries in Asia, it was found that of Japan is approximately 1,030.13 USD per month and that of Singapore is approximately 2,122.38 USD per month. It can be seen that both countries have higher average salaries than Thailand. The Thai government must have a policy to help graduates receive a higher average salary than the present and a good return on investment in education.

Comparing the investment return rate of 11% per year, the salary worth investing in social science studies in the 5 majors should average approximately 1,047.86 USD per month, which is 48.38% higher than the current average salary.

Consequently, the government should apply policies to improve the quality of education so that graduates graduate with quality and can work with higher salaries. Employers should also be willing to pay employees a higher salary. In cases where graduates are already working as employees, but their salaries are still low, the government should implement policies that encourage new graduates to do start-up businesses.

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Human Capital Investment in Science and Technology Education and Quality of Life in Thailand

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Abstract

Investment in education is a vital factor for the development of both individuals and the whole country. In Thailand, people have attempted to increase their human capital in terms of academic knowledge by studying in university as well as entering higher education with the expectation for higher wages and salaries, and a better quality of life. The Thai government has implemented policies to improve equitable quality education and the opportunity to access it. Moreover, the national education plan 2017-2036 is the ultimate goal to be achieved. In the digital economy era, science and technology majors have been important aspects of driving the country. Many students decided to study science and technology. This research uses secondary data from the National Statistical Office of Thailand and other related data sources to investigate the first-year income and the rate of return on studying in science and technology majors. The results showed that, in 2022, new graduates from science and technology fields earned wages and salaries higher than the poverty line and the minimum wage of Thailand. Most of them have a high quality of life. However, the high return comes with high responsibility as well. As analyzed, this research suggests that the government should focus on education improvement for people to enhance their labor productivity and quality of life.

Keywords: Human Capital, Education, Science, Technology, Quality of Life

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Introduction

In an era of ever-advancing science and technology, where the demand for skilled professionals in these fields is rising, the investment in science and technology education has become an exceptionally crucial investment in human capital. Governments, educational institutions, and private entities across the globe are aware of the necessity of promoting education that provides individuals with the skills, knowledge, and specialized abilities required in this area. The goal is to change how individuals lead their lives, conduct business, engage in societal development, drive economic growth, and tackle a range of challenges, spanning both the individual and society.

Education in science and technology provides individuals with knowledge and abilities that are in line with current labor market demands, particularly in specialized fields such as information technology and engineering. According to "The Future of Jobs Report 2023" released by the World Economic Forum, surveys assessing job requirements in the coming years reveal that over 85% of organizations intend to integrate new and innovative technologies into their operations. This includes expanding their digital footprint and embracing technologies such as Big Data, Cloud Computing, and Artificial Intelligence (AI). There is an anticipation of significant growth in technology-related employment over the next five years, with expertise in technology rapidly emerging as one of the top three critical skills in demand. It is expected that roles in sectors such as Big Data analytics, climate change and environmental management technologies, and encryption and cybersecurity will be the primary drivers of job expansion (WEF, 2023). Therefore, persons who seek education in these areas are more likely to have attractive career prospects, the possibility for large future income, and employment security.

According to the most recent data from Thailand's Ministry of Higher Education, Science, Research, and Innovation, there were 111,553 graduates from various educational institutions in the fields of science, technology, and engineering in 2020. There were 15,729 graduates in natural sciences, mathematics, and statistics, 10,248 graduates in agriculture, forestry, fisheries, and veterinary, 24,913 graduates in health, 15,537 graduates in information and communication technologies (ICTs), and 45,126 graduates in engineering, manufacturing, and construction. Furthermore, the number of students currently enrolled in science, technology, and engineering programs at all levels of education and in all academic years in higher education institutions totaled 497,855 in 2023.

Education is positively correlated with an individual's workforce efficiency. Those who achieve higher levels of education generally experience greater employment opportunities, and a lower probability of facing unemployment, and tend to earn higher incomes on average. Tuition fees, additional educational expenses, and opportunity costs during the study period are all costs of pursuing education beyond the mandatory and college levels. However, it provides benefits in the form of improved skills and certifications, resulting in higher salaries, more work opportunities, and an overall improvement in their quality of life (OECD, 1998).

The quality of life can be measured in a variety of ways, including health, well-being, and economic stability. Investing in human capital through education is a critical aspect in the creation of a high quality of life in this regard. This research aims to investigate the intriguing relationship between investing in human capital in science and technology education and the quality of life in Thailand.

Objectives

This research aims 1) to investigate human capital investment among undergraduate students in three significant majors of science and technology: information technology, engineering, and medicine. 2) to assess the quality of life that results from the returns on investment in science and technology education at the undergraduate level.

Literature Review

Human Capital

Chomtohsuwan T. (2016) defines human capital as the worth of each individual, similar to financial capital, which can generate monetary returns. Individuals with better human capital are more likely to benefit from higher returns. Human capital is classified into two types: (1) Implicit human capital, which includes unobservable elements of an individual that have been present since birth, such as IQ, abilities, attractiveness, genetics, and predecessors' values. Though it is not expressed in monetary terms, it can provide monetary returns. (2) Explicit human capital is the concrete component of human capital. Each person starts with nothing and can build it up through numerous investments such as physical development, healthcare, basic consumption, knowledge and skill acquisition, and formal education.

Gary S. Becker, an American economist who was awarded the Nobel Prize in Economics in 1992, discusses human capital as a characteristic that cannot be separated from the individual. This includes knowledge, skills, health, or inherent values within a person that affect productivity and economic potential. These aspects are inseparable from the individual, much like the movement of financial assets or physical assets (Becker, G. S., 1993). Similarly, Simon Burgess defines human capital as the skills, characteristics, and knowledge that individuals accumulate. It encompasses a wide range of valuable skills and is not limited to just IQ. It is not possible to clearly specify which type of human capital is the most important. Human capital is the result of investments in education, and this investment is not limited to educational institutions alone. Families also play a significant role in this investment process (Burgess, S., 2016).

Human capital, according to Claudia Goldin (2016), is the skills, abilities, health, and expertise gathered through human work that may be used in production, like physical capital, which includes factories, equipment, machinery, and numerous instruments. Human capital and physical capital are both the result of investment decisions that have considerable direct investment costs. Investing in human capital incurs opportunity costs in terms of individuals' time.

Human capital focuses on the individual, in contrast to social capital, which emphasizes relationships. Human capital is the foundation of economic growth, assessable primarily through educational attainment and direct returns in terms of income and productivity. Additionally, it provides indirect returns in terms of health and civic activities. However, measuring the returns on human capital remains a significant challenge, especially those that are 'non-economic,' impacting quality of life and social cohesion (Helliwell, J. F., 2001).

The analysis of human capital is related to the abilities developed through both formal and informal education, both in educational institutions and at home, training, experiences, and development from labor market mobility (Mincer, J., 1981). Mincer also refers to the concept

of 'capital' put forth by Irving Fisher, a renowned American economist. Fisher posited that capital includes any asset that generates income, and he argued that human capital should be considered a part of this asset. Human capital cannot be traded, it exists in the form of skills and abilities that can be leased, and the process of investing in human capital often involves activities that go beyond trading.

The World Bank has defined the term "human capital" as comprising knowledge, skills, and health that individuals invest in and develop throughout their lives. These elements make them aware of their potential as productive members of society. Investing in people through nutrition, healthcare, quality education, careers, and various skills leads to the development of human capital. This is a crucial factor in achieving equality and fostering improved economic growth. The World Bank collaborates with governments in 90 countries through the Human Capital Project (HCP), using human capital investment as one of its primary approaches to achieve the goal of alleviating extreme poverty by 2030 and promoting shared prosperity globally (World Bank, 2019).

Human Capital Investment

Human capital reflects the concept that humans are valuable resources. Investment in human capital can yield significant economic and social returns. Investing in human capital is a process that involves utilizing various resources such as time, money, and effort to enhance individuals' skills, knowledge, abilities, and other attributes. As a result, it influences the overall productivity and economic capacity of individuals. Individuals can improve their chances of future employment and income generation by investing in education, training, and personal development in a variety of areas. This emphasizes the idea that humans are not merely labor factors but valuable assets that can increase their worth through investments. Education and training are the most important components of human capital (Becker, G. S., 1993). There is research that shows that education at the high school and college levels in the United States significantly increases individual income even after accounting for both direct and indirect educational expenses. Furthermore, there is similar evidence from various countries with diverse cultures and economic systems, indicating that the income of individuals with higher education is often higher on average, and generally, post-expense income is much higher in less developed countries.

Theodore William Schultz, an influential economist in the study of human capital theory, proposed the idea that investing in oneself enables individuals to expand their life choices and is one way to elevate their well-being. He argued that humans are assets of value similar to physical capital or machinery. Developing skills, knowledge, and health in individuals can increase their economic value and contribute to economic growth. Education, training, and geographical mobility for job opportunities are forms of crucial investments in human capital that yield returns in the form of higher income, improved job prospects, and overall economic and social progress. Individuals' varying incomes may reflect differences in health and education as fundamental factors (Schultz, T. W., 1961).

Mincer, J. (1981), a human capital analyst, showed interest in the subject of educational investment within educational institutions. He argued that the expenses associated with education, borne by students or their parents, encompass not only tuition and other learning-related costs but also the foregone earnings that could have been earned had the time spent in education been used for income-generating work instead. This potential income is considered the most valuable cost, accounting for more than half of the total educational costs.

Quality of Life

The World Health Organization (WHO) defines "quality of life" as an individual's view of their place in life concerning their goals, aspirations, standards, and concerns in the context of the culture and value systems in which they live. "Quality of life" is a broad and complicated notion that includes physical health, mental well-being, independence, social interactions, personal views, and the individual's relationship with the particular characteristics of the environment. This definition expresses the viewpoint that "quality of life" entails an evaluative assessment within the context of culture, society, and the environment.

Referring to the quality of life model by Felce and Perry (1995) explains that "quality of life" refers to overall general well-being, which encompasses idealized indicators and assessments related to physical, social, material, and emotional aspects. This comprehensive evaluation of well-being comprises three groups of factors: objective life conditions, personal values and aspirations, and the subjective feeling of well-being.

John Kenneth Galbraith presented an essay titled "Economics and the Quality of Life", which explored the relationship between economics and the overall well-being or quality of life of individuals and society. He put forth the idea that a broad set of indicators is necessary to assess the quality of life, including access to education, healthcare, a clean environment, and social services. The measurement of quality of life must consider the holistic aspects of these various aspects. Considering economic growth measures such as GDP alone is insufficient for assessing the well-being and happiness of individuals and society as a whole.

Income: An Indicator of Quality of Life

The Organization for Economic Co-operation and Development (OECD) conducted a study on the quality of life of people in its member countries, totaling 447. This research considered well-being across 11 areas, including income, jobs, health, access to services, environment, education, safety, civic engagement, housing, social support network, and life satisfaction (OECD, 2022). Income is a key component in determining quality of life.

According to the salary report for the year 2023 in Thailand, conducted by Adecco, it was found that the spread of COVID-19 during the years 2021-2022 had an impact on the uncertainty in the labor market. This led to a downward shift in the starting salaries of recent graduates, decreasing from $428 to $343, and even touching the minimum wage level of $285. However, in the year 2023, the starting salaries for recent graduates have once again reached $428. Currently, incomes in the technology sector are increasing. In order to earn a higher salary, job applicants or workers must have additional skills, such as language and communication skills, as well as the ability to work collaboratively with others. These complementary skills help enhance their abilities and make employers more willing to offer higher salaries.

Methodology

This research collected secondary data from various sources, as follows: Data on the daily expenses of the Thai population from the Household Socio-Economic Survey (SES) conducted by the National Statistical Office of Thailand. Data on the salary of new graduates in the year 2022 was obtained from universities, government agencies, and private

organizations. Data on tuition fees and various education-related expenses were obtained from both public and private educational institutions. Other data from relevant studies.

This research divides the sample into three groups based on the major of study in science and technology at the undergraduate level. The details are as follows:
- Engineering major (22 years of study, starting work at the age of 23)
- Information technology major (22 years of study, starting work at the age of 23)
- Medicine major (24 years of study, starting work at the age of 25)

The estimated human capital is derived from the various expenses incurred by individuals from the time they are in the womb of their mother until they complete their undergraduate degree. These expenses consist of three main components: basic living expenses, education-related expenses, and the opportunity cost of choosing to pursue education beyond high school and undergraduate levels without gaining income from working.

The rate of return on human capital investment is calculated based on the net return that graduates in each field receive in their first year of employment, in comparison to the human capital cost of those graduates. The net return is the income earned after deducting basic living expenses during the working years. This research estimates the income in the first year of employment, which primarily comes from two main sources: salary and bonuses.

This research assesses the quality of life of those who have completed education in science and technology majors. This research utilizes income from employment as a factor. In this research, the quality of life is segmented into six levels, categorized by the average monthly income level, which is estimated from the average monthly income per person, classified by population group according to the level of income throughout the nation (Quintile by income) for 2021, using data from the Office of the National Economic and Social Development Council.

Table 1: Quality of life level divided by average monthly income

Average monthly income ($)	Quality of life level
≤ 85.93	Poor
> 85.93 – 151.48	Low
> 151.48 – 221.44	Low-medium
> 221.44 – 333.93	Medium
> 333.93 – 768.74	High-medium
> 768.74	Hight

Results

Human Capital Investment

This research calculates the value of "Human Capital" based on the investments covering educational expenses, basic living costs, and opportunity costs. The results indicate that the highest investment is in the field of medicine, totaling $192,034.16, followed by engineering at $103,891.66 and information technology at $102,620.09, as shown in Figure 1. The average human capital investment across all three majors is $132,848.64.
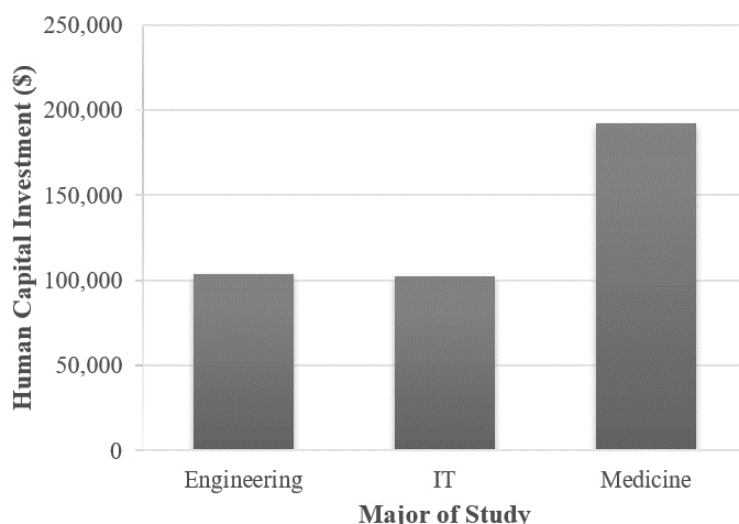
Figure 1: Human Capital Investment

Human capital investment in medical education is 84.84 percent higher than in engineering and 87.13 percent higher than in information technology. Meanwhile, investment in engineering major is 1.24 percent higher than in information technology major.

Returns on Human Capital Investment

A study of returns from human capital investment in education considers the average monthly monetary returns from working during the first year of employment after graduation. These returns consist of income from salaries and bonuses. The study found that graduates from the medical major received the highest average monthly returns, at \$2,107.92, followed by engineering at \$746.67, and information technology at \$719.42, as shown in Figure 2. On average, the average monthly returns from working during the first year across all three academic majors amounted to \$1,191.34.

Investing in a medical major provides a 182.31 percent higher return than investing in an engineering major and a 193 percent higher return than investing in an information technology major. In the meantime, investment in engineering provides a 3.79 percent higher return than investing in information technology.
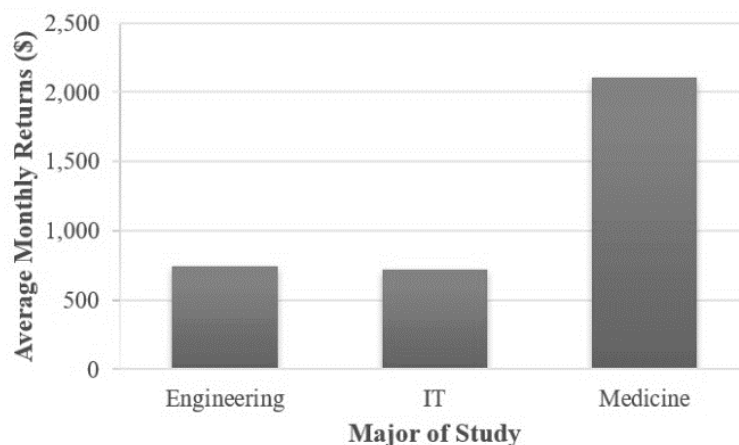
Figure 2: Average monthly returning during the initial year of employment
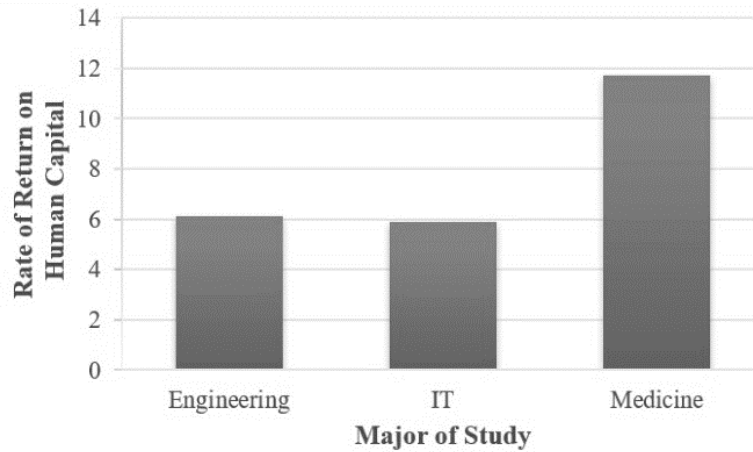
Figure 3: Rate of return on human capital

The rate of return for the first year is 11.74 percent in the major of medicine, 6.13 percent in engineering, and 5.89 percent in information technology, as shown in Figure 3. The average rate of return across all three majors is 7.92 percent.

Assuming consistent monthly monetary returns for graduates from all three majors, the break-even period for educational investment is approximately 9 years for medical education, 16 years for engineering, and 17 years for information technology.

Quality of Life Assessment

The study found that investments in all three academic majors yield monetary returns that can result in a good quality of life. Investment in engineering and information technology education leads to graduates having a high-medium quality of life level, while investment in medical education leads to graduates having a high quality of life level.

In engineering and information technology majors, graduates receive an average yearly return of $746.67 and $719.42, respectively. These returns fall within the income range of $333.93 to $768.74, indicating that individuals who complete their education in these areas have a high-medium quality of life. For graduates in medicine, the average yearly return is $2,107.92, which falls within the income range of $769 and above, indicating that individuals who complete their education in this field have a high quality of life.
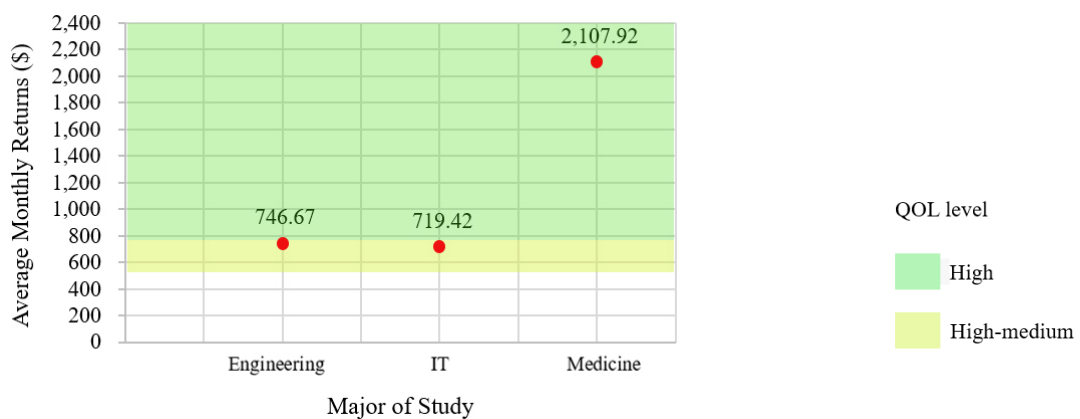
Figure 4: Assessing the quality of life (QOL) of engineering, information technology, and medicine graduates.

According to the study's findings, graduates with a major in engineering, information technology, and medicine had a higher quality of life than those with income at or below the poverty and minimum wage levels. In 2021, Thailand's national average minimum wage was approximately $221.65 per month, falling within an income range of $221.44 to $333.93, indicative of a medium-level quality of life. Those with a monthly income at or below the current poverty line, set at $80.01, experience a poor quality of life.

Conclusions and Recommendations

Investment in human capital in science and technology education is crucial for stimulating economic growth and improving the quality of life. The study results show that individuals who complete their education in science and technology majors: engineering, information technology, and medicine enjoy a good quality of life. Therefore, promoting and supporting education in these areas is essential for the development of the country and the enhancement of people's quality of life.

Promoting Human Capital Investment in Education

Promoting investment in human capital in science and technology education requires cooperation from multiple sectors, including the government, educational institutions, and the private sector.

1. Government
The government can support and create opportunities for access to education in science and technology through various policies. For example, allocating funding for scholarships or financial assistance to students who are interested in or pursuing undergraduate degrees in science and technology fields, especially students from disadvantaged backgrounds. Such initiatives will help reduce financial barriers to education and address educational inequality, particularly in fields with shortages that require significant educational investment, such as medical studies.

The government can still allocate an additional budget for education to support educational institutions in acquiring sufficient resources for the development of graduates in this field. With this budget, educational institutions can improve their facilities and procure educational equipment, especially in fields that require high-value educational equipment, such as medical and engineering. The government should encourage educational institutions to incorporate technology and innovation into the learning processes, for example, supporting the use of teaching technology and online learning development.

These roles of the government sector align with the national education plan 2017-2036, which aims to provide access to educational opportunities, ensure educational equality, improve educational quality, and enhance efficiency in response to the challenges of the contemporary world.

In addition to promoting education, the government also plays a key role in promoting a high-quality life for graduates, such as creating opportunities for employment by encouraging investment in science and technology to increase job opportunities in these professions. Moreover, the government should regulate and enforce the fair regulation of labor laws and regulations to protect workers' rights, guarantee workplace safety, promote access to

affordable and high-quality healthcare services, and foster work-life balance through appropriate working hour policies.

2. Educational institutions

Education institutions ought to enhance their science and technology curricula to remain up-to-date and ensure a high standard, thus enabling the production of graduates equipped with knowledge and skills that align with present and future labor market requirements.

Moreover, these institutions should actively endorse research initiatives, fostering the generation of fresh knowledge and offering students opportunities to engage in research projects. One of the primary objectives of educational establishments is to augment the workforce in these domains, thereby addressing the shortage of professionals. They should also prepare their facilities and teaching equipment to be fully equipped for creating an optimal learning environment, as certain scientific and technological disciplines necessitate the utilization of cutting-edge technology.

3. Private sector

The private sector can promote human capital investment for science and technology education through financial support. Examples, providing scholarships to capable but financially disadvantaged students, research grants for researchers, and funding for various creative and innovative projects, which encourage the discovery and development of new technologies.

Furthermore, the private sector can collaborate with educational institutions to develop curricula that better align with the industry's needs and the job market. Providing internship opportunities for students helps enhance their knowledge and skills by allowing them to learn from real-world experiences.

Studying Quality of Life Factors

Quality of life is a complex topic that requires consideration of various elements. To develop quality of life, the following key factors must be studied:

1. Health and well-being

Caring for both physical and mental health, including engaging in regular exercise, maintaining a balanced diet, getting adequate rest, and preserving mental well-being, are all essential factors that enhance the quality of life. Moreover, residing in a home and working in an environment that provides clean, suitable living conditions, while ensuring safety for both life and property, also plays a significant role in promoting a high quality of life.

2. Work-life balance

Despite the high salaries and employment security available to those who complete their education in engineering, computer technology, and medicine, most people in these fields frequently work hard, are under a lot of stress, and struggle with health problems. These factors, in turn, significantly reduce their quality of life. Maintaining a balance between work, relaxation, family time, and leisure improves quality of life.

3. Financial security

This research divides the quality of life according to income levels, which is a factor reflecting economic well-being. However, having a good quality of life should also prioritize

financial stability. Good financial planning is a way to create financial stability in both the present and the future, especially during the post-retirement phase. This helps reduce stress and increase life satisfaction.

4. Happiness and life satisfaction
Happiness and satisfaction are also factors in assessing the quality of life. Happiness stemming from strong relationships within the family and with friends, as well as satisfaction with life and work resulting from doing a job one enjoys and is skilled at, all play a significant role in determining a person's quality of life.

5. Contribute to society
Participating in society and collaborating with others are crucial in shaping the quality of life. These actions foster happiness, stability, and purpose in one's life.

Utilizing education and skills to positively contribute to society, addressing issues, mentoring others, and undertaking impactful projects, as doctors do, fosters a sense of involvement in resolving challenges. These actions enhance one's joy, self-fulfillment, and satisfaction in personal achievements, all of which profoundly influence the overall quality of life.

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Flexible Teaching in Rural Philippine Higher Education:
Attitude and Anxiety of Educators as Predictors of Readiness

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Abstract

This study investigates the level of readiness of educators towards shifting to flexible teaching in terms of attitude and levels of anxiety. The respondents were 179 educators from the seven campuses of Northern Iloilo State University, Philippines selected through proportional random sampling. This study employed the descriptive cross-sectional study using a survey research design. Data were gathered using a validated and reliability-tested researcher-made questionnaire. Results were analyzed using statistical tools such as Means, Standard Deviation, and T-test for Independent Samples, Analysis of Variance (ANOVA), and Pearson-r. The results of the study revealed that the educators' level of readiness towards flexible teaching in terms of attitude was neither positive nor negative as an entire group, however, as to academic rank, instructors have positive attitudes while college professors have negative attitudes toward flexible teaching. In terms of anxiety, educators have mild levels of anxiety. No significant differences were observed in terms of attitude when classified as to age, sex, civil status, length of teaching experience, and workload, however, a significant difference was observed in terms of anxiety when educators were classified as to sex. Furthermore, the educators' attitudes have a negative significant relationship to anxiety.

Keywords: Flexible Teaching, Higher Education, Attitude, Anxiety, Readiness

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Introduction

The COVID-19 pandemic has created the largest disruption of education systems in history, affecting nearly 1.6 billion learners in more than 190 countries and all continents. Closures of schools and other learning spaces have impacted 94 percent of the world's student population, up to 99 percent in low and lower-middle income countries (UNESCO, 2020). Since the education of learners cannot be further delayed, schools have decided to reopen through online delivery (Brooks & Grahek, 2020). However, not all are equipped with the necessary tools for online education. This posed a problem for certain nations which already had an existing predicament in education even before the pandemic.

In the Philippines, aside from professional dilemmas such as coping with the demands of shifting to a new mode of instruction, educators must also deal with constant worrying for themselves and their family's safety which burden their mental well-being. A study by Talidong and Toquero (2020), revealed that Filipino educators experienced anxiety throughout the pandemic and have coping practices to deal with it. In Higher Educational Institutions, where learners came from different parts of the country and with different levels of economic status, remote learning delivery became an option, especially in rural areas where most of the learners lived in provinces and islands. In these circumstances, purely online learning is not applicable; hence, institutions turn to flexible teaching.

Flexible Teaching or flexible delivery is a mode of education more adaptable to time/geographical constraints than face-to-face classrooms. It often appeals to mature, rural/remote students or others with competing life demands (Ragusa, 2009). In much simpler terms, flexible teaching is a means of implementing flexible learning, which is a combination of digital and non-digital technology that ensures the continuity of inclusive and accessible education in the form of online, offline, or blended modes of teaching and learning processes (Ulanday, Centeno, Bayla, & Callanta, 2021). Flexible learning and teaching have gained significant attention for decades (Yuan, Wu, Xiong, Li, Xei & Liu, 2021). Flexible delivery is an approach to education that is student-centered, in respect to teaching and learning methods and resources, which caters to individual differences of learners and is free from the limitations of the time, content, access/entry requirements, instructional approaches/design and place and pace of study (Lundin, 2012; Huang, Liu & Zhan, 2020). It can be full-online, blended learning, flipped classroom, and distance learning (Abisado, Unico, Umoso, Manuel, & Barroso, 2020).

Flexible Teaching was applied in the Northern Iloilo State University and its campuses in the 5th district of the province of Iloilo, Western Visayas, Philippines where students, educators, and the school itself, are located mostly in coastal and agricultural areas in the province. As a precautionary measure against the spread of the virus, the institution transitioned to flexible teaching to continue its service of educating the learners in any way possible. The sudden shift in teaching style caused struggles and an array of challenges that college instructors must overcome to deliver the education that their students need. With these demands in the workplace and the personal dilemma the educators were experiencing, the question of how ready were the educators for this sudden pedagogical shift arises. Given the case of educators in Northern Iloilo State University, where flexible teaching was implemented and both educators and learners lacked resources to implement the necessary means of a smooth transition from the traditional method of learning, this study was conducted to assess the attitude, and level of anxiety of educators as predictors of their readiness during the shift to flexible teaching.

Methodology

This study used the cross-sectional descriptive method to determine the level of readiness of educators in Northern Iloilo State University during the shift towards flexible teaching. The respondents of the study, which was determined through proportionate sampling, were the 179 permanent teaching faculty from the seven campuses of Northern Iloilo State University.

All the respondents were actively teaching in higher education and have shifted to flexible teaching during the pandemic. They were classified according to age, sex, civil status, academic rank, length of teaching experience, and workload.

Categories	f	%
Entire Group	179	100
A. Age		
Young (≤40 years old)	80	44.69
Old (>40 years old)	99	55.31
B. Sex		
Male	68	37.99
Female	111	62.01
C. Civil Status		
Single	44	24.58
Married	135	75.42
D. Academic Rank		
Instructor	68	37.99
Assistant Professor	59	32.96
Associate Professor	50	27.93
College Professor	2	1.12
E. Teaching Experience		
Short (≤15 years)	105	58.66
Long (>15 years)	74	41.34
F. Workload		
5 and below	140	78.21
Higher than 5	39	21.79

Table 1: Distribution of the Respondents by Category

The research instrument used in the study was a survey questionnaire on educators' readiness towards flexible teaching made up of validated and reliability-tested, researcher-made questions that explored the respondents' profiles and assessed their attitudes towards flexible teaching. The last section adopted the General Anxiety Disorder 7-item (GAD-7) scale developed by Spitzer and colleagues (2006) which was used to measure general anxiety symptoms across various settings and populations (Johnson, Sverre & Ulvenes, Pål & Oktedalen, Tuva & Hoffart, Asle, 2019).

Results and Discussion

Attitude. Results of the mean analysis revealed that the level of readiness of educators towards flexible teaching in terms of attitude was "Neither Positive nor Negative" when the respondents were taken as an entire group. When grouped as to age, sex, civil status, length of teaching experience, and workload, results further revealed that the educators' level of readiness as to attitude is "Neither Positive nor Negative" (m= 3.11-3.38; SD= .72 -.86).

However, when grouped as to academic rank, Instructors' level of readiness towards flexible teaching in terms of attitude was "Positive" (m= 3.41; SD= .82), Assistant Professors and Associate Professors both were "Neither Positive nor Negative", whereas College Professors results were "Negative" (m= 2.4; SD= .42). This means that the knowledge of teachers on computers and related technology influences their attitude toward any form of learning involving these tools. The same applies to instructors, who are mostly younger and technology-savvy, and college professors mostly of retirement age.

This supports the study of Krishnakumar & Rajesh (2011) wherein results revealed that teachers who possess knowledge about computers and technology have a more favorable attitude towards e-learning. In the said study, a significant difference was observed in the attitudes of teachers who have blogs and teachers who do not. Another by Badia, Garcia, & Meneses (2018), concluded that teachers' relationship with technology plays a key role in them feeling relaxed or stressed, a common occurrence in an online teaching and learning environment.

Category	N	Mean	S.D.	Description
A. Entire Group	179	3.26	.79	Neither Positive nor Negative
B. Age				
Young (>40 years old)	80	3.34	.78	Neither Positive nor Negative
Old (≤40 years old)	99	3.21	.80	Neither Positive nor Negative
C. Sex				
Male	68	3.30	.84	Neither Positive nor Negative
Female	111	3.24	.76	Neither Positive nor Negative
D. Civil Status				
Single	44	3.38	.86	Neither Positive nor Negative
Married	134	3.23	.77	Neither Positive nor Negative
E. Academic Rank				
Instructor	68	3.41	.82	Positive
Asst. Professor	59	3.18	.75	Neither Positive nor Negative
Asso. Professor	50	3.21	.79	Neither Positive nor Negative
Professor	2	2.3	.42	Negative
F. Teaching Experience				
Short (≤15 yrs)	105	3.34	.79	Neither Positive nor Negative
Long (>15 yrs)	74	3.15	.79	Neither Positive nor Negative
G. Workload				
5 and below	140	3.30	.81	Neither Positive nor Negative
Higher than 5	39	3.11	.72	Neither Positive nor Negative

Scale: *4.21–5.00, Highly Positive; 3.41–4.20, Positive; 2.61–3.40, Neither Positive nor Negative; 1.81–2.60, Negative; 1.00–1.80, Highly Negative*

Table 2: Level of Readiness of Educators towards Flexible Teaching in terms of Attitude

Anxiety. When taken as entire group, the level of anxiety of the educators towards flexible teaching was "Mild" (m= 1.82; SD= .71). Moreover, when categorized as to age, civil status, teaching experience, and workload, the level of readiness of the respondents in terms of anxiety was "Mild" (m= 1.77-2.00; SD= .66-.75). However, when categorized as to sex, males have "Normal" (m=1.62; SD= .75) anxiety level, while females have "Mild" (m= 1.94; SD= .66) anxiety level. When categorized as to academic rank, associate professors have a "Normal" (m= 1.73; SD= .68) level of readiness towards flexible teaching in terms of anxiety, while instructors, assistant professors, and college professors have "Mild" (m= 1.80-1.91; SD= .68-1.21) level of readiness towards flexible teaching in terms of anxiety. It must be noted, however, that although associate professors have a "Normal" level of anxiety, the mean score was along the borderline with only a .03 difference of having "Mild" anxiety. This implies that educators exhibited symptoms that are attributed to a mild level of anxiety due to the current situation brought about by the pandemic. Educators felt the said symptoms during the shift to flexible teaching as they were working at home and the number of positive coronavirus cases was adding up globally and locally.

Several research studies have been made concerning educators' anxiety levels during the pandemic with results ranging from mild to severe levels of anxiety among educators. A study with similar results was conducted in Mexico by Delgado-Gallegos, et. al. (2021) with 63.6% of the 220 respondents exhibiting mild levels of anxiety. A study done in different universities in Latin America by Urcos, et al (2020) showed that 92.3% of 207 educators exhibit a severe level of anxiety with only 6.8% showing a moderate level and 1% mild level of anxiety, and mostly reflected in the female sex. The large percentage of severe anxiety was believed to be a result of the social isolation measures that have been put in place to counter the spread of COVID-19.

	Category	N	Mean	S.D.	Description
A.	Entire Group	179	1.82	.71	Mild Anxiety
B.	Age				
	Young (>40 years old)	80	1.86	.75	Mild Anxiety
	Old (≤40 years old)	99	1.78	.68	Mild Anxiety
C.	Sex				
	Male	68	1.62	.75	Normal Anxiety
	Female	111	1.94	.66	Mild Anxiety
D.	Civil Status				
	Single	44	1.83	.72	Mild Anxiety
	Married	134	1.82	.71	Mild Anxiety
E.	Academic Rank				
	Instructor	68	1.80	.76	Mild Anxiety
	Asst. Professor	59	1.91	.68	Mild Anxiety
	Asso. Professor	50	1.73	.68	Normal Anxiety
	Professor	2	1.86	1.21	Mild Anxiety
F.	Teaching Experience				
	Short (≤15 years)	105	1.79	.69	Mild Anxiety
	Long (>15 years)	74	1.86	.74	Mild Anxiety
G.	Workload				
	5 and below	140	1.77	.70	Mild Anxiety
	Higher than 5	39	2.00	.72	Mild Anxiety

Scale: 4.00-3.22, Severe Anxiety; 2.52-3.21, Moderate Anxiety; 1.77-2.51, Mild Anxiety; 1.0-1.76, Normal

Table 3: Level of Readiness of Educators towards Flexible Teaching in terms of Anxiety

Differences in the level of readiness of educators towards flexible teaching in terms of attitude when classified as to certain categories. Employing T-test for independent samples, the following results were revealed as to the level of readiness of educators in terms of attitude when they are classified as to certain categories. The results revealed that when classified as to age, $t(177)= 1.086$, $p= .279$, sex, $t(177)= .445$, $p= .657$, civil status, $t(177)= 1.115$, $p= .266$, length of teaching experience, $t(177)= 1.597$, $p= .112$, and workload, $t(177)= 1.358$, $p= .176$, the level of readiness of educators towards flexible teaching in terms of attitude have no significant differences. These results failed to reject the null hypothesis which states that: "There is no significant difference in the level of readiness of educators towards flexible teaching in terms of attitude".

This implies that regardless of the educators' age, sex, civil status, length of teaching experience, and workload, their attitude on the readiness towards flexible teaching are basically the same. The said result disagreed with that of the study of Moralista & Oducado (2020) which revealed that there was a significant difference in the favorability of educators toward online education in terms of sex, age, college, educational attainment, years in teaching, academic rank, level taught, and employment status. According to the study, this may be due to the availability or unavailability of technological equipment and stable internet connection to every faculty, which is a necessity for online education.

Category	d.f.	Mean	S.D	t-ratio	p. value
A. Age					
Young	177	3.34	.78	1.086	.279
Old		3.21	.80		
B. Sex					
Male	177	3.30	.84	.445	.657
Female		3.24	.76		
C. Civil Status					
Single	176	3.38	.86	1.115	.266
Married		3.23	.77		
D. Teaching Experience					
Short (≤15 years)	177	3.34	.79	1.597	.112
Long (>15 years)		3.15	.79		
E. Workload					
5 and below	177	3.30	.81	1.358	.176
Higher than 5		3.11	.72		

Note: $p < 0.05$ significant at 0.05 alpha

Table 4: Differences in the level of readiness of educators towards flexible teaching in terms of attitude when classified as to certain categories

Differences in the level of readiness of educators towards flexible teaching in terms of anxiety when classified as to certain categories. Using t-test, the differences on the level of readiness of educators towards flexible teaching in terms of anxiety was determined. T-tests results revealed, that there is no significant differences in the level of readiness of educators towards flexible teaching in terms of anxiety when grouped as to age, $t(177)= .721$, $p= .472$, civil status, $t(177)= .092$, $p= .927$, length of teaching experience, $t(177)= -.678$, $p= .499$, and workload, $t(177)= -1.857$, $p= .065$. However, a significant difference is present when they are grouped as to sex, $t(177)= -2.953$, $p= .004$.

The null hypothesis which states that: "There is no significant difference in the level of readiness of educators towards flexible teaching in terms of anxiety" was failed to be rejected

if the educators were grouped according to age, civil status, length of teaching experience, and workload but was rejected when educators were grouped as to sex. This implies that anxiety towards flexible teaching differs between males and females. The mean value of females was found to be higher than that of the males.

This result supports the findings in the study of Li, Miao, Zeng, Tarimo, Wu, & Wu (2020), wherein an overall anxiety prevalence was recorded through an online survey assessing anxiety in teachers during the epidemic of COVID-19. Eighty-eight thousand six hundred eleven (88, 611) responses from educators all over China were analyzed and results showed that the prevalence of anxiety was higher for women than men. Furthermore, another study by Ozamiz-Etxebarria, Dosil-Santamaria, Picaza-Gorrochategui, & Idoiaga-Mondragon, (2020) yielded the same results where the female sex manifests more numbers in all anxiety levels compared to the male sex.

	Category	d.f.	Mean	S.D	t-ratio	p. value
A.	Age					
	Young(>40 years old)	177	1.86	.75	.721	.472
	Old (≤40 years old)		1.78	.68		
B.	Sex					
	Male	177	1.62	.75	2.953	.004
	Female		1.94	.66		
C.	Civil Status					
	Single	177	1.83	.72	.092	.927
	Married		1.82	.71		
D.	Teaching Experience					
	Short (≤15 years)	177	1.79	.69	.678	.499
	Long (>15 years)		1.86	.73		
E.	Workload					
	5 and below	177	1.77	.70	1.857	.065
	Higher than 5		2.00	.72		

Note: p < 0.05 significant at 0.05 alpha

Table 5: Differences in the Level of Readiness of Educators towards Flexible Teaching in terms of Anxiety when classified according to certain categories

Differences in the level of readiness of educators towards flexible teaching in terms of attitude and anxiety when classified according to academic rank. ANOVA results revealed that there are no significant differences existing in the level of readiness of educators towards flexible teaching when classified as to academic rank in terms of attitude, F(3, 175)= .538, p= .657, and in terms of anxiety F(3, 175)= .538, p= .657. This implies that the level of readiness of educators towards flexible teaching in terms of attitude and anxiety of instructors, assistant professors, associate professors, and college professors are the same.

Category	Sum of squares	d.f.	Mean Square	F	p. value
A. Attitude					
Between Groups	.82	3	.274	.538	.657
Within Groups	89.09	175	.509		
Total	111.63	178			
B. Anxiety					
Between Groups	.82	3	.274	.538	.657
Within Groups	89.09	175	.509		
Total	89.91	178			

Note: p < 0.05 significant at 0.05 alpha

Table 6: Differences in the level of readiness of educators towards flexible teaching in terms of attitude and anxiety when classified according to academic rank

Relationship between attitude and anxiety. Pearson's-r computation revealed that the educators' attitude was negatively related to anxiety, (r= -.259, p=.000). This implies that the attitude of educators towards flexible teaching is highly dependent on their level of anxiety. Most likely, when educators feel anxious, their attitude towards instruction is affected. Moreover, this result is very much similar to that of Alqabbani, et. al. (2020), wherein a significant moderate negative correlation was obtained between anxiety and attitudes of university instructors who were the respondents of his study.

	Attitude	Anxiety
Attitude		
Pearson r	1	-.259
Sig.(2-tailed)		.000
N	179	179
Anxiety		
Pearson r	-.259	1
Sig.(2-tailed)	.000	
N	179	179

Note: Significant at 0.01 level (2-tailed)

Table 7: Correlation matrix between attitude and anxiety

Conclusion, Implications, and Recommendations

Based on the result of the study, among the dependent variables which determine the readiness of educators towards flexible teaching, their readiness in terms of anxiety should be given attention as findings showed a mild level of anxiety present among the educators. The study concludes that educators are still in the process of adjusting to the transition from traditional face-to-face instruction to flexible teaching, as findings of this study revealed that although their attitude remains in neutral level, a mild level of anxiety is present among the educators.

When flexible teaching was mandated by the Commission on Higher Education (CHED) to be the mode of instruction in HEIs in the Philippines, educators immediately complied and adapted themselves to the sudden transition from the traditional mode of instruction and coping with the new mode of instruction has been difficult for educators as it requires ample

time for preparation of modules and advance knowledge in ICT. Although technical support from the administration was given, the current situation caused mild anxiety to develop among educators. The presence of mild anxiety is due to factors related to work demands and personal concerns during the onset of the pandemic. Having one of the most important and diverse roles in society, educators were anxious about their personal and family safety, in addition to the demands of their profession including constant concern for the future of instruction and the learners.

The findings of this research further implied that the psychological well-being of educators affects their performance and should be given utmost importance as it negatively affects their attitude towards flexible teaching. The mild level of anxiety of educators should be addressed to prevent it from developing to a severe level, further affecting their work performance. A growing number of studies related to anxiety and stress in the workplace revealed that the efficiency and productivity of workers are highly associated with their psychological state. Educators are no exception. Having one of the most stressful and demanding professions, it is therefore of utmost importance that any feeling of stress and anxiety must be addressed, and educators must be given time to relieve themselves of these negative feelings, which are one of the causes of ineffectiveness.

Since recurring mild anxiety symptoms can have a long-term effect on their productivity and performance, both personally and professionally, a productivity enhancement program through stress and anxiety reduction is recommended to be proposed as part of the wellness program of the university. School administration should support educators with anxiety especially during these challenging times to ensure efficiency and prevent burnout.

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The Implication of Subconscious Approach in Stimulating the English Language Knowledge for Interpreting-Majored Students

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Abstract

This study investigated the implication of the subconscious teaching approach in stimulating the English language knowledge for Interpreting-majored students. The researcher analyzed some relevant theories: Universal Grammar of Noam Chomsky and Stephen Krashen's Second Language Acquisition. After examining these theories, a proposed subconscious teaching approach was developed to improve the situation of lacking English knowledge by some students in the Interpretation major. This study's method mostly follows the qualitative and quantitative approaches with 80 participants who are seniors from the Faculty of Foreign Languages, Nha Trang University, Vietnam. The study results revealed the whole picture of utilizing the subconscious approach. In stimulating English language knowledge for students. This could also contribute to further improvements in language skills in teaching.

Keywords: Second Language Acquisition (SLA), Universal Grammar, Subconscious

Introduction

The typical challenges in interpretation crucially focus on the lack of competency in listening and speaking skills. From the observation of the researcher, however, Interpreting-majored students tend to be trained in the approaches mostly concentrating on developing interpreting skills. Practice, as a result, obviously works on the aspect of brain plasticity, and the learners can certainly feel the familiarization of repetition, but some of them hardly possess a solid foundation of language knowledge. Admittedly, the constitution of fluency and accuracy in language performance necessarily requires a language base. To consolidate language knowledge playing an irreplaceable role in the language performance of interpreters, the writer examined the subconscious mind by researching its features combined with the Universal Grammar theories and some second language acquisition hypotheses of Stephen Krashen. The specific implication of this article concentrates on students in English interpreting classes in Vietnam.

Literature Review

Subconscious Mind

Pierre Janet – a famous neurologist and psychologist – introduced the concept of the subconscious mind in one of his works in the late 1880s with the definition concerning this term as a "powerful awareness" located underneath the conscious mind (Ellenberger, 1970). In 1893, Sigmund Freud also mentioned the subconscious mind in his writing as a layer, which could not link to the consciousness. However, in 1990, Freud described the human mind by using the topographical model of three levels, which were "conscious mind", "preconscious mind" and "unconscious mind", and he refused the term subconscious mind. Since then, the subconscious mind and preconscious mind have been confused and they are often overlapped. After Sigmund Freud's work, Latham, Stajkovic and Locke (2010) repeated the subconscious mind in their article, and they believed that it could operate "without intention, awareness and conscious guidance". According to Yogachara – a philosophy of Mahayana Buddhism, the subconscious mind is called Ālayavijñāna whose function is a "storehouse – consciousness" (Berzin, 2013). In conclusion, from the mentioned concepts, the subconscious mind can save all types of information received from the senses.

The Universal Grammar

Universal Grammar was mentioned as the "system of categories, mechanisms and constraints shared by all human languages and considered to be innate" (Chomsky, 1986). White (2020) also noted in her book that UG theories mostly focused on the acquisition process of language and the language constituency. Baker (1979) referred to UG as a theory consisting of the content regarding the natural device of language learning in the human mind. The sense of realizing the incorrectness existed in the sentence production was considered an obvious capability.

Following this, it can be inferred that the real essence of UG is the existence of an innate device in the human mind. Throughout the development of UG, lots of scholars have been also carrying out numerous studies regarding the relationship between UG and Second Language Acquisition (SLA). Chomsky (1980) asserted that "language faculty" might be a "mental organ", proving that language itself can be acquired naturally in every human. Language acquisition can be considered the development of the mental organ of language

through language experiences. Universal Grammar certainly follows the natural approach of language forming, leading to a perfect combination of second language acquisition and the innate elements existing in the human mind.

Second Language Acquisition (SLA)

In the history of linguistics, language acquisition was first explained by Skinner (1957); however, it was criticized by Noam Chomsky. Particularly, he assured that language could not be learnt through "reinforcement" since the "innate" elements always existed in human development. Chomsky continued this study by inventing the theory of *Universal Grammar* (1965). In 1967 and 1972, Pit Corder and Larry Selinker continued this trend of research by proposing theories concerning "learners' errors" and "interlanguage". The history continued with some hypotheses of Stephen Krashen – a key scholar in the field of SLA. He gave a concept of SLA as a similar process to the stages of acquiring language of children (1981), and he mentioned the importance existence of "input" in establishing the core language knowledge deleting the feeling of imperfection in language performance. Krashen (1982) determined that language acquisition and language learning were two separate stages, which possessed the features of "consciousness" and "subconsciousness" in each process. However, Krashen received lots of criticism from other scholars, who did not approve of the necessity of language acquisition, and they mostly did not concentrate on the intrinsic power of the learners' minds but the language teaching. Since then, the two concepts of "consciousness" and "unconsciousness" have become one of the most controversial issues in second language learning.

The Comprehensible Input and the Natural Order Hypotheses

In 1985, Stephen Krashen proposed a Monitor Model consisting of five hypotheses (*The acquisition-learning–learning hypothesis, The Natural Order hypothesis, The Monitor hypothesis, The Input hypothesis, and The Affective Filter hypothesis).* In this section, the Comprehensible Input and the Natural Order hypotheses are analyzed.

The comprehensible input of Stephen Krashen is a theory of second language acquisition that states that learners acquire a language when they understand messages or texts that are slightly above their current level of competence. According to Krashen, comprehensible input is the necessary and sufficient condition for language learning, and it occurs when learners are focused on the meaning rather than the form of the language. Krashen also proposes that there is a natural order of acquisition that is independent of the order of teaching and that learners have an internal monitor that can correct their errors based on their learned knowledge of the language. The Comprehensible Input is one of the most successful hypotheses of Stephen Krashen in the research approach of SLA. In a study by Krashen in 1982, he inferred the process of SLA with the necessity of "comprehensible input". This has the power as a potential lever in helping one person acquire a language with a well–founded approach. He assured that language was only acquired through the understanding process (Krashen, 1985), proving the role of comprehensible input was inevitable. In his hypothesis, he mentioned "i" as the current level of the learners and "i + 1" as the level that the learners aimed to achieve. This explained the reason for creating an "i + 1" input to build the learners' language acquisition processes.

The natural order hypothesis is a theory of second language acquisition proposed by Stephen Krashen in 1977. It states that learners acquire grammatical structures in a predictable and

fixed order, regardless of their native language, the age of acquisition, or the amount of exposure. The hypothesis is based on evidence from studies of learners' errors and developmental stages in various languages. According to Krashen, the natural order hypothesis reflects the innate and universal principles of language learning that are independent of external factors. Schmidt (1990) explained in their writing that the Natural Order hypothesis emphasized on the order of acquiring linguistic patterns of the language learners. Krashen (1987) proposed a table of illustrating the order of language acquisition of language learners as follows:
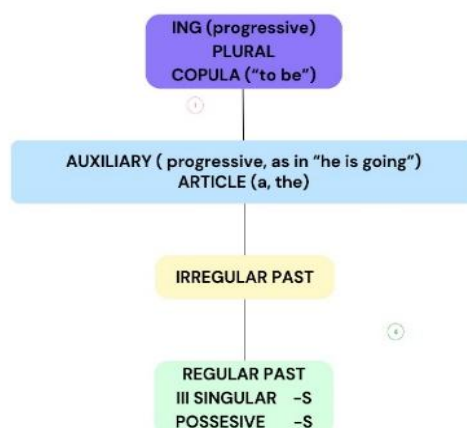
Figure 1: Natural order of language acquisition

Interpretation and Second Language Acquisition

Interpretation or Interpreting implies the most common way of deciphering correspondence between hearing people, who convey in communicated in language, and people who impart in gesture-based communication.

The process of interpretation consists of the specific stages existing in language production. Kormos (2014) clarified these as *conceptualization*, *formulation*, *articulation* and *self–monitoring*. Students, therefore, cannot have good skills in interpreting if they do not possess a solid foundation in language. Nhi (2017) presented diagrams concerning the processes of interpreting from English to Vietnamese and vice versa. She mentioned the stages of *conceptualization* and *formulation* after "transferring" language. This means that the interpreters should reach the level of fluency when they want to achieve perfect language understanding and speaking skills while interpreting. It is evident that before students start their major as interpreters, they have to be trained carefully in four basic language skills (listening, speaking, writing, and reading). Most teachers tend to focus on "how to teach to help the learners perform the language well" rather than "how to teach to help the learners acquire the language well". The researcher concluded that the lack of acquisition leads to a lack of foundation. Therefore, it will be impossible for interpreting students, who still haven't possessed enough language knowledge during the basic skills training, to achieve their perfect language performances.

The Subconscious Approach Model

The Equilateral Triangle of LRD

LRD stands for *listening, reading* and *discussing*. These kinds of activities establish a solid foundation for language development. From the writer's perspective, the equilateral triangle of LRD can help instructors be flexible in designing activities. The instructors in Interpreting classes, therefore, can conduct discussion activities inside the classrooms, while reading & listening activities will become the learners' homework.

LRD equilateral triangle possesses the power of the preconscious. In fact, in this writing, the researcher wants to emphasize the status in the middle of the "unconscious" and "conscious" mind when acquiring language. With LRD, the learners can have opportunities to develop their language mysteriously without awareness. Regarding *Listening*, students can absorb the "tunes" of language, which includes the pronunciation and the familiarization of sounds. At the same pace of language acquisition, *Reading* can establish the "bone" of language consisting of a vast number of vocabularies and grammatical patterns. *Reading* and listening activities, therefore, can help promote the neuroplasticity. With *discussion*, this factor is the connection of *Reading* and *Listening*. It means that when receiving the "input", the learners should have the opportunity to practise with the "output" because, without the appearance of this practice, language performance hardly occurs.

Designing Reading & Listening Activities

While the success of an English–Vietnamese interpreting process crucially focuses on language understanding, the process of interpreting from Vietnamese to English requires a solid background of general language knowledge. The instructors should design activities for students to practice at home, and check their results.

Reading activities should concentrate on solving the problem of how to read rather than the desire to understand. By concentrating on this feature, the instructors can think of an approach, which emphasizes two steps of reading including *"general reading"* and *"close reading"* (Peter Newmark, 1988). In the aspect of *Listening*, interpreting requires flexibility in understanding. This element needs the familiarization of sounds and the realization of words. When examining these two skills, the writer concluded that it is extremely necessary to connect *Listening* and *Reading* activities. The instructors can design these activities by following the topics that were prepared at the beginning of the courses. In the listening activities, the instructors have to focus on developing "note–taking" skills because it can promote some sub–skills in practising interpreting, and the number of times that students can listen is also an aspect of research that the instructors should consider.

However, the analysis above may lead to one question: should all the listening and reading materials be only in English to help Vietnamese students acquire the English language perfectly or should they be in both two languages (English and Vietnamese language)? From the researcher's study, because of the particular features of interpreting students, which require the learners to be fluent in both the source language and target language, the appearance of English and Vietnamese materials in the process of forming the language foundation is necessary. Nevertheless, Vietnamese materials should only exist in *Reading* because listening to the Vietnamese language is quite superabundant in language acquisition. Although the students are Vietnamese, reading in the Vietnamese language is also a

supporting activity for being flexible in using vocabulary when interpreting English to Vietnamese.

Discussion – The Bridge to Success

The bridge that can connect the two hemispheres of *Listening* and *Reading* is the role of discussion, and this activity is in the classrooms. The discussion is considered language immersion because it can reflect the language performance of one person. The most crucial points that an instructor should remember are the type of discussion and how a discussion goes appropriately. In the writer's opinion, to have an effective discussion, which can promote the ability of language performance of interpreting students, the discussion should be in a formal style. There is a fact that working as an interpreter will be like acting on a stage, and an interpreter will be a speaker in using both source language and target language. It is, therefore, necessary to improve public speaking skills for the learners. Furthermore, the activities of speaking in the discussion can help the learners recall their memories concerning the "input" and also apply the "input" to specific contexts of language performance. Without discussion activity, the instructors and the learners cannot evaluate any success in the process of establishing language core. From the experience of the researcher, the small form of panel discussion may be effective because the learners can improve their public speaking skills and also their abilities to be flexible in using language. Discussion, therefore, is likely a tool whose function is bridging the language's bone and language's soul together, and it also creates a lever promoting the ability of language performance.

What students perform in a discussion can be seen as the data from the area of the preconscious mind. However, different people are going to have a different view on this aspect because they believe that students learn everything from *Listening* and *Reading,* so they will store the knowledge in the area of the "conscious mind" not in the area of nearly "unconscious", and this perspective of ideology mind leads to a controversial pattern. Admittedly, it is extremely hard to give evidence of "consciousness" or "preconsciousness", but the writer can give her points of view on that, focusing on the memories of the learners. When the instructors require students to read or to listen at home, they do not concentrate on obligating the students to remember everything. If the learners do not remember anything, which process has happened in their brains? "Consciousness" means that you consciously try to remember and apply everything in the discussion process; however, students just naturally absorb the language. Therefore, the "preconscious" approach is relevant to the discussion process.

Research Methodology

Research Questions

This study aimed to investigate the effects of implementing the subconscious approach in stimulating language knowledge for English-interpreting major students, so the following research questions were proposed:

- How is the subconscious approach applied in the Interpreting teaching process?
- Can the subconscious approach be applied in the Interpreting teaching procedure?
- Is the subconscious approach effective in stimulating language knowledge for Interpreting-major students?

Participants

This study focused on one main group of 80 juniors coming from two Interpreting classes at Nha Trang University. These learners passed Interpreting 1 (according to the program of English-language major at Nha Trang University, the students have to complete 03 compulsory Interpreting subjects namely Interpreting 1, Interpreting 2 and Interpreting 3), so they certainly possess intermediate English language level. However, once teaching in the current circumstance, the researcher realized that their English language foundation encountered a large number of issues. This led to the decision to implement the new teaching approach to improving their language levels.

Instrumentation

The study followed the qualitative approach in collecting the research data. In detail, two research instruments were utilized.

Pre-test & Final Test

Before applying the subconscious approach in the teaching process, the researcher designed a pre-test to evaluate the level of the participants to get the most practical results regarding their features. The test required the students to get involved in solving some relevant interpreting tasks, and these tasks also reflected the language levels of the learners.

After being taught by using the subconscious approach, the participants were then tested by a similar test with quite different content to evaluate the effects of the approach.

Semi-structured Interview

The researcher designed two sets of semi-structured interviews to get the participants' perspectives concerning the effects of the subconscious approach in helping them consolidate their language knowledge.

The first set of interviews was conducted before using the subconscious approach. The questions were as follows:
  - What is your English language level?
  - Do you think you have enough language knowledge to perform well in the interpreting process?

The second set of interviews was used after implementing the subconscious approach in the teaching process. The questions include:
  - Can you feel the improvement of your English language knowledge?
  - Can you feel the improvement in your language performance in the Interpreting process?
  - Did you encounter any difficulties in being taught by implementing some subconscious-approach activities?
  - Do you think that the new approach in Interpreting the teaching process is useful for your Interpreting learning?

Findings and Results

Findings

The Pre-test Results
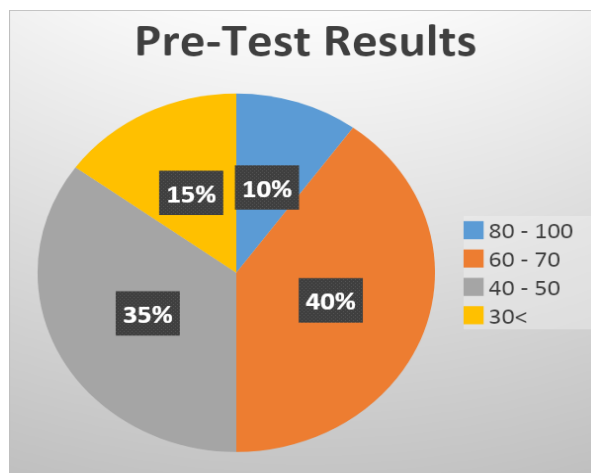
Figure 2: Pre-test Results

The pie chart given indicates the percentage of the participants' pre-test results. From the chart, it can be seen that most of the learners achieved scores from 60 to 70 (accounting for 40%), and the second position belonged to the group of results ranging from 40 to 50 (35%). The smallest percentage of the results was the group of 80 to 100 (10%), and 15% of the learners received scores below 30.

The Final Test Results
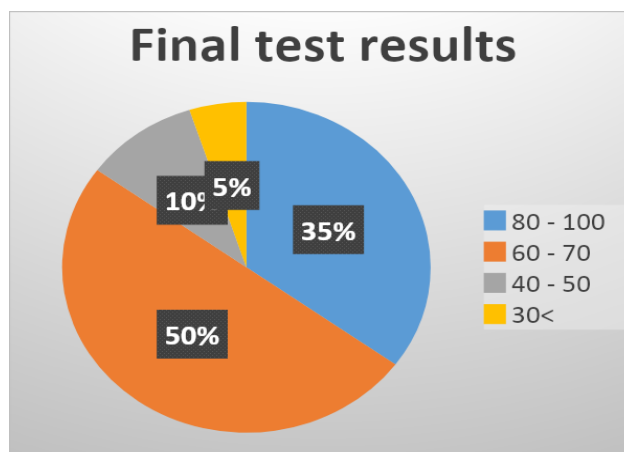
Figure 3: Final Test Results

The pie chart illustrates the percentage of scores received by the participants in the final test. In general, the largest percentage of results was the group of 60 to 70 (50%), followed by the group of 80 to 100 (35%). 10% of the learners got from 40 to 50, and 5% of them possessed scores below 30.

Results of the First Set of the Semi-structured Interview

Being asked about the level of their English language, most of the participants responded that they were at the B2 level, and only 10 students admitted their levels as C1. In the second question, 60 learners confessed that they had encountered a large number of difficulties in dealing with the interpreting process due to the lack of English language foundation. The other 20 participants expressed their ideas regarding their English language level confidently, and they clarified that what they needed to practice was all about the interpreting skills, not the language itself.

Results of the Second Set of the Semi-structured Interview

In the first question concerning the effects or improvement after being instructed by the subconscious approach, 60 participants could feel the changes in their language foundation, but the other 20 of them said that they could not find anything. The second question investigated the language knowledge in the participants' interpreting processes. In detail, 65 students could consolidate their language knowledge, while 15 of them could not reach their targets. Additionally, the participants were also required to indicate information regarding the difficulties they encountered during the whole stage of getting involved with the subconscious approach, and 46% of them responded that the new teaching approach was quite challenging. The last question motivated students to provide their general comments on the effectiveness of the subconscious approach in learning Interpreting, and 60% of the participants agreed that their interpreting skills were improved significantly.

Discussion

The Results of the Pre-test

The results in findings showed that most of the participants were at an intermediate level of interpreting skills when participating in the pre-test because precisely 40% of them achieved scores from 60 to 70. Honestly, the results were beyond the researcher's expectations due to the fact of her observation of her students' language performances during their learning processes. In another aspect of the data collection, the circumstance seems to be reflected in the group of students receiving scores from 40 to 50. It revealed the fact that the students could not perform their language level clearly due to some reasons. The first assumption is that the students are not familiar with the knowledge in the test since they are at the beginning of the course. The researcher then re-examined the test content, and she found out that its content was not the problem. The test content mostly focused on language knowledge rather than interpreting skills, proving that the students could perform without the background knowledge regarding the interpreting course. As a result, the researcher concluded that the participants were at the intermediate language level. In terms of the group of scores below 30, 15% of them received the mentioned results, proving that some students encountered various issues in their learning. In general, although most of the participants achieved intermediate results in their tests, this can also reflect that the learners have still experienced some language problems due to the results' subjective features.

The First Set of the Semi-structured Interview

The students were required to clarify their English language level in the first question, and their responses were quite similar compared to the pre-test results. This revealed that the

students were precisely positioned at the intermediate language level. Additionally, the number of participants who chose C1 as their level was only 10, accounting for a small percentage of the high-skilled language performance, proving that there was a gap in language level among the participants.

These 10 learners could also become good samples of experiencing the subconscious approach in the teaching process, although the main aim of this teaching method mostly concentrated on language learners with a low language knowledge background. Following this, the participants continued to admit the difficulties in learning Interpreting, which was influenced by the lack of language knowledge. Thanks to the participants' features, the researcher could implement the approach to improve the learners' foundation. One of the most typical participants' responses was that they could feel the lack of language knowledge, and they even tried to practice interpreting skills to change their level, but nothing was improved. Others also confessed that if they had carefully learned language skills, they would have changed their English levels. The students realized their weaknesses; however, they did not know the best solutions for their improvements. Hence, it shows that if the learners lack their language knowledge, they hardly improve or learn interpreting perfectly. Additionally, it can also be concluded that interpreting practice cannot change their language performance if they do not know their appropriate training or practice solutions. Fortunately, the participants tended to have the awareness to realize their weaknesses. As a result, their awareness of learning could help them achieve better results in learning with the subconscious approach. Once they know that they need to build their language foundation, they certainly can control the most precise track to follow. In the first part of the interview, the researcher also received a typical response, and the answer was beyond the researcher's expectation since she had not thought of a situation in which the learners could know what they needed to improve. From the response, the researcher can conclude that these students possessed some significant language achievements, proving that they could easily improve their language levels but were not trained appropriately.

The Second Set of the Semi-structured Interview

Regarding the improvement of general language knowledge, although 60 students could feel the changes, this feature could not reflect the positive outcomes of the subconscious approach. The finding, therefore, is quite neutral, which means that it cannot help the researcher conclude the influence on affecting language knowledge. In the improvement of language performance in the learners' interpreting process, 65 of them received good outcomes of the new teaching method, proving the absurd features in the results. Some of them could feel positive differences in their interpreting processes, but they could not feel the changes in their basic language skills. Did they indicate precise results or did they understand themselves clearly? The assumption can be inferred that they could not control or they could not manage their language improvement. They received some changes in their language levels, but they could not realize their real features. In some responses, they assured that their speaking skill improved dramatically, proving that the most influential language skill in this case could be the oral communication aspect. In the next question, the difficulties concerning the new teaching approach were investigated. 46% of the participants asserted that they met some difficulties. In the response, the students mentioned the teaching requirements inferring that the researcher should consider the issues of instructions. From the response, the researcher could "feel" that the learners certainly encountered various problems in their language foundation since they could not complete the basic requirements relating to some simple reading and listening activities. The researcher also examined the features of the

activities that she designed in her classes, and she found out that only 10% of them should have been reconsidered. As a result, the research could clarify the levels of the learners and also intended to adjust the difficulties in the lessons to reduce the gaps in their learning processes. The subsequent question focused on their interpreting skills. More than half of them agreed that they could be more successful in conducting their interpreting processes.

From the analysis, some conclusions can be made. The first glance at the interview revealed that they were quite similar, and they tended to investigate some similar aspects at the same time. The purpose of creating some relevant issues in the questions could activate the real features of the learners. If the participants possessed some similar points in their responses, this indicated the consistency of their thoughts. In contrast, if they had different ideas concerning the issues, they certainly created fake results. In this case, the results' features seem quite unreliable. This implies that the learners themselves may hide something, or they do not manage and understand their English language level in their interpreting learning process.

The Results of the Final Test

The results of the final test reflected that the learners received better scores compared to the ones in the pre-test. The percentage of the group from 60 – 70 and 80 – 100 increased significantly, proving the changes in their skill and language levels. However, this feature was not objective because, during the whole semester, the participants also had to get involved in special interpreting skill training. Hence, it might have influenced their improvement. To get a more precise outcome, the researcher compared the results of the tests and she realized that the participants could receive some good impacts from the new teaching approach through the appearances of their feelings.

Conclusion

Through the findings, the researcher could conclude that the subconscious approach itself is powerful since it already touches and changes the root of the problems in the language performance of the students. In particular, speaking skills can be considered one of the most affected and improved language skills that the participants could gain during the implementation of the teaching approach. The equilateral triangle LRD creating neuroplasticity existing in the approach can be considered a "lever" in smoothing the process of language acquisition. When analyzing and applying this approach to the real circumstances of each class, the instructors need to have a good evaluation of their student's language abilities. In detail, they should base their teaching on these features to design appropriate useful and meaningful activities to help the learners reach the expected targets. More importantly, it is also necessary to examine the activities before instructing the students to get involved due to the fact that each learner will experience the knowledge and abilities differently, leading to the influence on their learning outcomes. In addition, although the subconscious approach mostly affected the speaking skills of the learners, it did not mean that other language skills were not improved. From the features, the researcher has to be more flexible in discovering various aspects of the learners and start to design the teaching approach appropriately. This approach will be examined and developed to erase the gaps in the language knowledge of the learners in Interpreting classes and also in other language classes.

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Do Prior Knowledge of Advanced Mathematics Influence Academic Confidence of Students Taking Pre-university Chemistry Courses

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Abstract
The relationship between Chemistry and Mathematics are directly proportional in the perspective of science, technology, engineering, and mathematics (STEM) education. This study investigates the relationship between prior advanced mathematical knowledge attained in high school could predict the outcome of student's overall confidence in studying Pre-University Chemistry courses. Mathematics is often perceived as a subject that bridges and connects scientific concepts including Chemistry. Most students, however, struggle with the transition from mathematics to chemistry due to wide disparities between the two theoretically but a very slim margin in terms of using mathematical applications into learning STEM subjects, particularly chemistry. This paper uses a mixed-method approach that involved quantitative surveys using questionnaires and selected qualitative interviews using Pre-University students as research samplings. Preliminary findings found positive significant correlation between students' mathematics background played indicative confidence levels in Pre-University Chemistry. Most participants agreed that good mathematical skills in high school play major role in shaping their confidence in Pre-University Chemistry including the integration of mathematical equations, algebra and certain calculus application would support their understanding within the chemical concepts and crucial for their overall understanding in the subject. This research findings also suggest that there is a need of a more integrated approach by educators in teaching mathematics and chemistry at high school level with primary emphasizing the interconnections between the two disciplines by providing sufficient support in order to enhance greater confidence and competence level.

Keywords: Chemistry, Confidence, Educational Assessment, Mathematics, Science Education

Introduction

This dissertation explores the importance of prior mathematic units taken by Pre-University students taking Chemistry as their core subject and how advanced mathematical skills can shape academic confidence and build learners' motivation in the build-up of challenging Chemistry program at different type of Pre-University courses offered around the world.

In my capacity as a Chemistry teacher in few International Schools that I have taught at both Upper Secondary and High School levels specialising in the British A-levels and also tutoring chemistry students from different Pre-University programmes background like the International Baccalaureate (IB), American Advance Placement (AP) and the Australian Year 11 and Year 12 High schoolers , I had witnessed many students regardless of curricula struggling to cope with the vast intensity of the subject's requirements; both theoretical and practical. One of it, is the demanding mathematical skills application in Chemistry.

Chemistry involves significant number of mathematical calculations which are important in daily practice of life (Tapia, 1996) particularly in areas such as stoichiometry, thermodynamics, and kinetics. Students having strong foundation in mathematical skills such as algebra, calculus and statistics would have an upper hand in applying such skills into chemistry. While prior mathematical knowledge is essential in doing well in STEM subjects in university, particularly Chemistry, but whether it is a mandatory knowledge remains to be seen in a larger scale.

The focus of this dissertation is to find out do prior advanced mathematical skills have any effect on the academic confidence and motivation of Pre-University students taking Chemistry particularly focusing on their subject strength and to address difficulties students would face during the entire duration of their pre-University programme. At the same time, I would also research on different Pre-University Chemistry curricula with the emphasis on its connection with prior mathematical skills requirements which could indirectly influenced one's confidence in studying Chemistry at Pre-University level. The impact of different Chemistry curricula on student's confidence and motivation has not been widely studied so my aim is to divulge more on this subject. My conceptual framework in this study is to connect the existing knowledge done and examine further on using my research question in this dissertation to explore additional possibilities. Few research findings have found that many students could still proceed to study Chemistry at higher tier without the needs of mathematics while some disagree with the ideology. Several researchers agreed that mathematics is just a tool but not primarily needed in doing great science subjects (Jogalekar, 2013). I aimed to challenge this statement and my research will explore how reliable are these scientific inquiries.

This dissertation also talks about how the evolution of mathematical chemistry and their relationships changed the landscape on how learners cope with the intensity of both subjects. The literature review also studies the vast differences of some popular Pre-University courses offered globally and their roles in preparing students especially on their readiness and confidence when comes to the topic on how the subject mathematics can be blended into learning Chemistry effectively and vice-versa. This is extremely important as one's academic success in the subject relies heavily on how one single subject could overlaps onto another and their jointly progression into one's learning journey. The synchronisations of both mathematics and chemistry are well documented in many research findings and this study is to acknowledge the theory but at the same time, I would challenge some concrete well-

documented inquiry and try to explore other contradictions between the two subjects. This research findings also involved the introduction and how different Pre-University curricula offered globally could differ from each other especially focusing on the research question on how advanced mathematical modules can be blended into students taking Chemistry as their core subject at Pre-University level, with the primary focus on learner's academic confidence.

Research Framework

This project explores the advantages of the utilisation of mixed methods principles by using both quantitative and qualitative techniques. The introduction of triangulation approach were made connection with the current research framework.

Two major Pre-University Chemistry courses were selected out of a few surveyed and a thorough analysis between the two and investigation from the data obtained conduct an overall conclusion from the study.

Academic confidence is one of few major factors needed to be addressed and placed emphasis by academic authorities to ensure students display their maximum potential in their chosen course or modules either at Pre-University or undergraduate level. A thorough connections between some Pre-University Chemistry courses would have a small leverage over some in terms of its teaching syllabus that could predict the outcome of academic confidence faced by learners.

The different Pre-University Chemistry courses taken by majority of students vary in breath, depth, and difficulty levels. Some are more demanding than others while some required sufficient coursework, laboratory work, internal assessments and active presentation hours before students can complete the course and proceed to undergraduate level. Despite the differences between all the curricula, apparently all Pre-University Chemistry courses have one major similarity: the paramount understanding of substantial mathematical knowledge as a pre-requisite to fully comprehend the scientific concepts in higher level Chemistry. The results generated from this study was made to show whether the need of advanced mathematics is required or could benefit wholesomely for students undertaking Pre-University Chemistry courses.

Lastly, this paper summarises and explains how this research can support and contrast research done by others as well as some recommendations that could add more quality for further study. The research question which investigates the relationships between both mathematics and chemistry provide many insights on the factors and major elements that curriculum designers can take considerations and find ways to improve students' overall confidence in studying and learning chemistry at a higher level. The main theoretical framework of this study explores how my research in this dissertation is intrinsically linked and supported by existing literature and my research methodology on the relevance between advanced mathematics and Pre-University chemistry courses on various learners.

In short, my direction of this study is clear. I want to explore the significant impact on students' confidence levels when they study Chemistry as a Pre-University subject with the emphasis on which course provides a higher confidence threshold for high school learners. I have witnessed many students struggle to cope with the intensity and demand of the syllabus due to the requirements of mathematical skills and I aim to delve into this analogy, as well

finding ways to overcome this fear. As a high school Chemistry teacher, I hope I could find ways to provide adequate opportunities for my learners to maximise their potential by strengthening their mathematics skills to enhance their ability in succeeding learning Chemistry eventually.

Methodology

This study involves the experimentation of using questionnaire as my primary research findings. The main objectives mainly involved the research question on how or can prior advance mathematics skills could enhance academic confidence in high school students using different Pre-U Chemistry syllabi as responding variables. I will measure the data and aim to understand the responses from the pre-selected focus group which represents a subset of the general population of high school learners. The experimental methods used in this dissertation involved a random combined sampling method where questionnaire is designed to target a certain age-group population irrespective of genders. The sampling techniques are made to be a mixture of stratified and cluster whereby the ensuring of a particular category is represented in the sampling process (Voxco Insights, 2021) and clustering allowing only individuals in selected geographical locations namely in the Oceanic continent (Australia & New Zealand), North Americas, Asia, and Europe. In this case, this cluster sample are mainly targeting only students pursuing Pre-University Chemistry studies from the listed countries. Data collected in this survey is considered as non-experimental as my observation in the data obtained were merely based on *in-situ* information without an independent variable. As for the focus group of participants, students were selected in the age-group range of between 16-19 years old, and they represent a large majority of students undertaking Pre-University Chemistry courses before embarking in their respective undergraduate courses, mainly STEM modules in university upon graduating from high school. The selected participants came from different ethnic backgrounds at different geographical locations at different continents around the world. The racial profiling issue are strictly excluded in this study and individuals who take part in this questionnaire were not asked to reveal their racial identity to ensure maximum anonymity.

A questionnaire was carefully designed with a series of specific questions to evaluate students' responses over their thoughts and academic confidence in taking prior advance mathematics in high school and the connectivity with their ability in tackling Pre-University chemistry at the same time. My questionnaire has a research question title that was designed to be short but comprehensive. Questions mainly constituted of a series of four-fold Likert Scale modelling so that I could easily gather large amounts of data (Nemoto & Beglar, 2014) which comprised like *strongly agree*, *agree*, *somewhat*, and *do not agree,* ticking boxes and few numerical number choices of design using Semantic differential scales system of *1-5* numbering (The NIHR RDS for East Midlands/Yorkshire & the Humber, 2009) to collect respondents' responses on the specific question asked. There were also few *yes*, *true,* or *false* patterns which represent dichotomous questions type. In all, I kept the questionnaire's questions simple and easy to understand and avoiding ambiguous words are my priority. The use of complicated jargons and acronyms are eliminated (Sauro, 2021), and the questions are made to suit my respondents' vocabulary. Participants do not have to reveal their name to maintain confidentiality but providing an email address was made an option.

Questionnaire was made and distributed via google form application and were sent to participants in three (3) different channels:

a) *Students I am currently tutoring which constitute different Pre-University Chemistry curricula namely, the A-Level, IB, AP, and the Australian ATAR programme.*
b) *Students undertaking Pre-University Chemistry in selected registered member-only certain social media platform like Facebook.*
c) *Through my personal LinkedIn account that has a specific category which only involves individuals with certain engagement in tertiary Chemistry studies that made up of student-researchers as well as passionate Chemistry educators globally.*

Students in the first channel where I am currently tutoring were reminded to take part in the survey by clicking a link provided by the google form application. Meanwhile, for the two other channels which are the Facebook group and LinkedIn Chemistry group, I sent few reminders after asking the post administrator's permission with the intention of getting regular and consistent responses after dissemination and brief explanation of my research objectives in the group forum.

At the same time, few students were also randomly selected from the group for a face-to-face interview via online innovative communication technologies. I have chosen the videoconferencing platform, Zoom, to evaluate, select and provide a coherent data analysis (Archibald, Ambagtsheer, et al., 2019) from the questionnaire and see its correlation with the research question with the emphasis on the respondents' overall academic confidence and educational progress. This interview would be my secondary data source where I get to listen and do calculative observations on my respondents. After that, interpretation will take place from current existing studies. As for the quantitative analysis, my survey questionnaires are mostly made up of fixed and close-ended questions, thereby, using another alternative tool like videoconferencing would be beneficial to some respondents who prefers to reply at certain length. Zoom videoconferencing tool was selected due to its popularity and students' familiarity. The students were carefully chosen with the priority of their identities being made unknown and anonymity labelled. I chose interview as another platform of generation of qualitative research data because it provides rich source of information from a small group of interviewees point of view. Data collection using Interview methodology comprised of both structured and unstructured (Dovetail, 2023) where there is significant difference. The first-hand collection of data directly from primary source is as important as secondary data which relies from previously gathered resources (Clements, 2021). The current research trends have also demonstrated the reliability and convenience of collecting qualitative data using videoconferencing methodology (Archibald et al., 2019b). At the same time, interview provides my respondents their own viewpoint which has an open-ended question style whereby questionnaires are merely strictly closed questions which could inhibit the choices of respondents due to its limited choices (Mather, Fox & Hunn, 2009).

The first method where questionnaire was produced and distributed to the public were selected on random basis. As mentioned in the research design methodology, respondents came from different background and ethnic races. Students currently pursuing a course in Pre-University studies are targeted. The focus of attention here are the 4 major Pre-University courses researched in this study. This *sampling frame* from the earmarked population were adopted (NIHR Research Design for East Midlands, 2007) and carried out systematically. The students are also expected to take Chemistry as one of their core modules and have already finished high school in their respective countries, preferably taken advanced mathematics modules prior studying Chemistry at Pre-University level.

The Australian High School participants are expected to have completed their Year 10 prior to this survey. The IGCSE (International General Certificate of Secondary School Education) is the British Key Stage 3 equivalent and the MYP (Middle Year Programme) are some of the other completed courses from the British GCE A-Level and IB participants respectively. Meanwhile, the AP students taking part in the questionnaire are expected to have either completed their Grade 9 or lower secondary at school prior taking part in this study.

Participants are mainly drawn from the target population which corresponds to their interest in partaking this survey. Their identity will be kept anonymous and confidential with only their email addresses visible to the researcher. I strictly followed the 2018 General Data Protection Regulation (GDPR) where researchers conducting studies involving human participants will have responsibility of protecting the privacy of their respondents (Ryerson University, 2015). In an event where certain qualitative data are needed in my studies, I conducted a Zoom videoconferencing interview with my participants, therefore a letter of consent was generated for the students for their approval so that my respondents are aware of their anonymity rights are preserved in this paper investigation. I also aimed to maintain a researcher's bias-neutrality in my face-to-face interview by eliminating my own preferences and the data generated from the Zoom interview were compiled together with my questionnaire to summarise a final evaluation and conclusion at the end of this study. The main objective of this mixed-method study is to obtain a richer and hopefully, more comprehensive conclusion in this research study. My initial methodology of obtaining a rather larger sampling size is to reduce margin of error as I have expected not all my respondents that take part in my questionnaire will respond sensibly or there will be some form of existence of bias respondents which may provide inaccurate responses.

However, after some brain storming, I have decided to cap my respondent's quotas to a maximum of around 60-70, if desirable. I felt that response rates are a crucial factor that needed to be addressed by researchers. This is to ensure the quality and the outcome of the survey can be analysed accordingly at the end of this dissertation. Several studies have also conducted on the correlation between the number of questionnaires and the number of participants, including the length of the questionnaires. There were studies that found that respondents are more likely to respond to a shorter version of questionnaire compared to a longer one (Koitsalu et al., 2018). Inversely, Bolt (2014) on the other hand found that the length of a long questionnaire played no significant role in improving response rate. And since designing a questionnaire requires time and valid purpose, my studies focused on only 9 major questions with the aim of not making my respondents losing interest during the answering process. Sample sizes are kept at an acceptable region and the topic of interest are maintained throughout the duration of the survey. Faryadi (2019) explores the quality of data and sample size is not directly correlates. A huge sample size need not be necessary to produce good data as less is more. In responding to the researchers who found that the length of the questionnaire plays significant role to the quality of answers provided by respondents, I found that the quality of the questions is more justifiable rather than the quantity of questions. Therefore, my study was designed to ask my respondents only what is related to my dissertation's research question to ensure a straightforward and explicit response from my participants.

Results

	Overall Percentile	Advance Placement (AP)	Australian High School	British A-Levels	International Baccalaureate (IB)
Total number of students/respondents, (N=58)		3	14	36	5
Found Mathematics are essential before taking Pre-U Chemistry	84.5%	66.7%	71.4%	88.9%	100%
Found good grades in Mathematics modules would boost academic confidence in Pre-U Chemistry	48.2%	66.7%	57.1%	66.7%	80%
Found Pre-U Chemistry course rather challenging	41.4%	66.7%	50.0%	41.7%	40%

Table 1: Result findings for four major Pre-University Chemistry courses

	British A- Level	Australian High School ATAR
Total Representation of students, N=50	36	14
High Mathematics Competency	27.8%	50%
High Chemistry Competency	13.9%	7.1%
Overall High Confidence Level for Mathematics but not Chemistry	27.8%	35.7%
Overall High Confidence Level for Chemistry but not Mathematics	5.6%	28.6%
Overall High Confidence Level for both Mathematics & Chemistry	52.8%	42.9%

Table 2: Two main Pre-University Chemistry courses were compared

	British A-Level	Australian High School ATAR
Number of Participants, N= 50	36	14
Number of students have intention of dropping Pre-U Chemistry	8	5
Overall Percentage Value	22.2%	35.7%

Table 3: Attrition rates for two major Pre-University Chemistry courses

Figure 1:

How strongly do you feel the importance of prior knowledge of advanced mathematical skills before fully understand Chemistry?

58 responses

- Very Strongly
- Strongly
- Somewhat
- Not necessarily
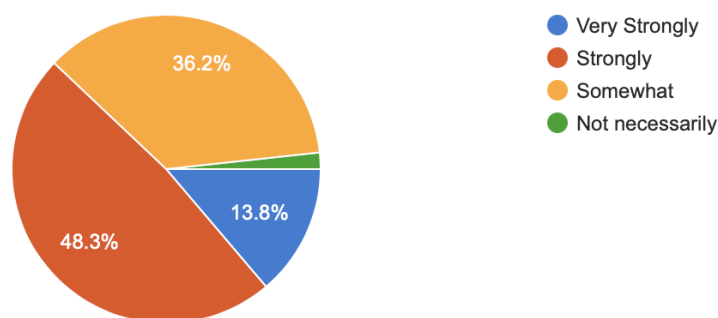
Figure 2:

Do you feel your selected course should involve prior mathematical knowledge?

58 responses

- Yes, most definitely
- Yes preferably
- Somewhat necessarily
- Not at all
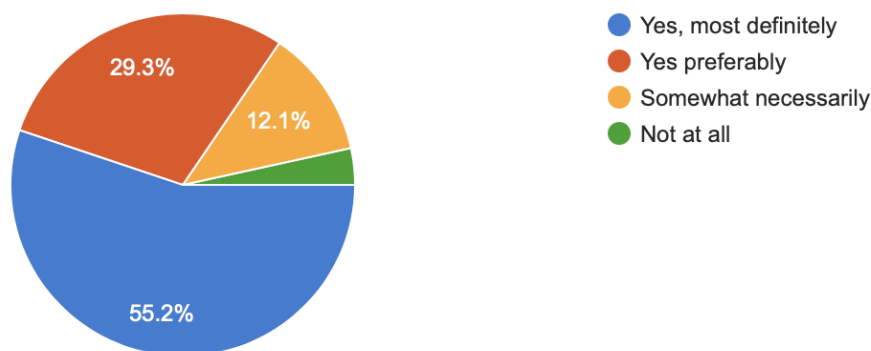
Figure 3:

How do you find the course you are currently studying?

57 responses

- ● Difficult & Challenging
- ● Difficult but Manageable
- ● Easy

71.9%

22.8%
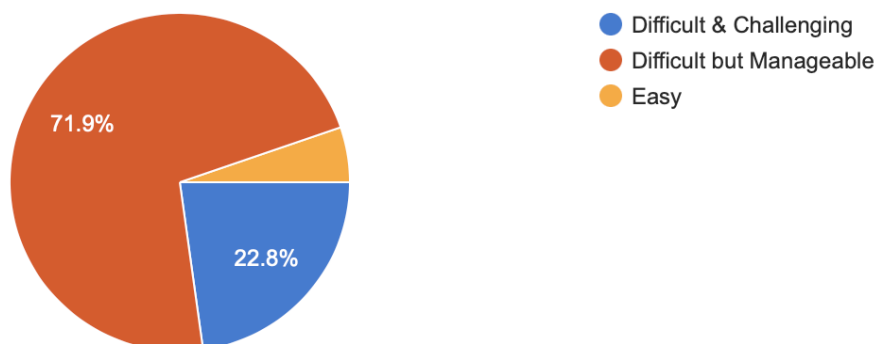
Figure 4:

Do you feel when a student does well in Mathematics will also excel in Chemistry?

58 responses

- ● Yes, very likely
- ● Sometimes
- ● No, not necessarily

31%

43.1%

25.9%
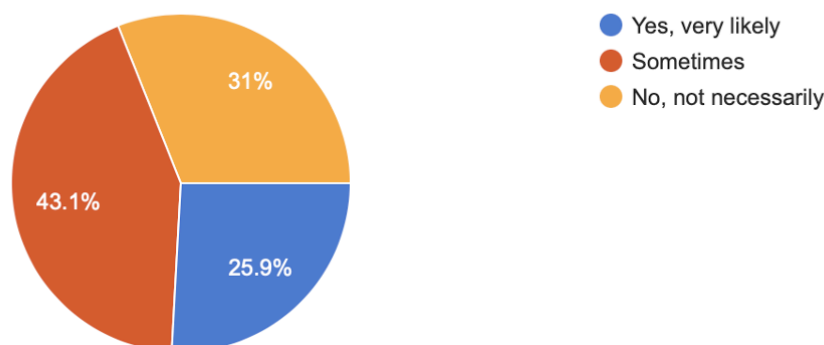
Data Analysis

There is a total of 58 respondents took part in this study which comprises 4 major Pre-University Chemistry courses. Random sampling found that from most of the Pre-University courses, the British A-level appeared to be the most popular amongst all Pre-University students that took part in this survey and Advanced Placement (AP) the least, with both registering a total of 36 and 3 respectively.

The result from this questionnaire found that all International Baccalaureate (IB) students found mathematics modules are important at high school prior taking higher level Chemistry at Pre-University level. Overall, the result found that a whopping 84.5% of the respondents agreed that mathematics is essential but only 48.2% found that obtaining good grades in mathematics do not necessarily guarantee a good academic performance or overall academic confidence in Chemistry at Pre-University level. At the same time, most A-Level students surprisingly do not find Chemistry as daunting as it seems with only 41.7% of participants found their courses challenging. AP Chemistry students registered highest percentage for finding its syllabus rather difficult.

Pie charts were generated from the questionnaire and demonstrated extremely diversified data giving researcher different dimensions and angles and opportunity of more intensive analysis. Each category was analysed and reflection of the overall idea of each question asked in the questionnaire were summarised accordingly.

Most students agreed that the mathematical components are important where 55.2% concurred that prior advanced mathematical knowledge is necessary and another 29.3% agreed taking mathematics modules at high school is a preferable option before taking Pre-University Chemistry. However, there were slight disagreements between some respondents who felt that prior mathematical knowledge may or may not contribute to overall confidence whatsoever. The 3.4% representation might be insignificant but this also showed that some respondents do not fully agree that the correlation of mathematics and chemistry must be parallel to each other.

Most Chemistry students somewhat agreed that advanced mathematics plays significant role in fully understanding the in-depth theoretical concepts of Chemistry. A combined proportion of 62.1% of the population felt strongly on the importance of advanced mathematical skills prior to fully understand Chemistry. This is worthy of attention as for students to do well academically in STEM, chemistry in particular, the ability of one in mathematics does play a convincing role. On the other hand, there were also a rather large number of respondents in this study (36.2%), that felt that only 'somewhat' important for mathematics in relation to fully understand any chemical concepts.

Conclusion & Future Recommendations

After thorough analysis of this study, there is an indeed some common connections between mathematics and chemistry and its outcome of student's academic performances. We cannot disagree that the integration of advanced mathematics into the academic curriculum of chemistry students has a profound impact on their overall academic confidence. Advanced mathematics equips chemistry learners with the tools to approach complex chemical phenomena with precision and rigor. Both questionnaire and interview results shown students would develop better understanding in theoretical Pre-University Chemistry if they have prior advanced mathematics knowledge in high school. However, there are also conflicting responses from respondents from various Pre-University Chemistry courses studied in this research that do not agree with the original hypothesis. Nevertheless, students studying the British A-level programme yielded the highest confidence level in this study compared with 3 other courses, which indirectly answered the hypothesis of my research question in this study. Regardless of these circumstances, I still felt that both educators and relevant school management policy administrators should play crucial role in introducing effective bridging programs for students at secondary and high school level to minimise academic deficiencies between both mathematics and chemistry. Teachers must be able to disseminate key skills like confidence and resilience to students for our learners to develop greater motivation in both well-being as well as academic proficiency. The incorporation of advanced mathematics into the education of chemistry students is not merely a means to an end; it is actually a transformative experience that empowers students to explore the intricate realms of chemistry with more confidence and enthusiasm.

Further and more elaborate research methodology is needed to draw a more accurate conclusion judging from the data obtained from the respondents. Perhaps, a narrowed down Pre-University Chemistry course could be used rather than 4 other courses which are simply

different in their curricula and course expectations on students. At the same time, the sample size could be increased to a larger pool to minimise percentage error. A targeted demographic can be used as well rather than a random selection which may cause confusion at some point. A more detailed, specific, and more inclusive questions can be created in the questionnaire for easier interpreting of results. At the same time, I felt a more accurate triangulation research survey should also include researchers' methods of gathering information at the same time (concurrent design methodology) rather than sequential design (Molina-Azorin, 2016) where time lapse occurs. In addition, the objective of a research study also depends on how the interviews and surveys are done where one can precedes another. This has implications for curriculum development and educational strategies, emphasising the importance of mathematics education in chemistry programs to foster a positive collaboration and competence among future chemistry researchers.

Further research should explore the mechanisms underlying this relationship and investigate potential interventions to improve advance mathematical skills among Pre-University chemistry students.

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Diversity and Interesting: International Students' Perception of Chinese Video Programs to Supplement Cultural Teaching

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Abstract
The growth of Chinese language education on a global scale has significantly aided the dissemination of Chinese culture. The primary venue for introducing Chinese culture to international students is the classroom. Therefore, when practicing classroom teaching of the Chinese language abroad, it is important to consider and plan how to introduce Chinese culture in a way that will make the recipients happy, simple, and quick to accept it. As media teaching tools, Chinese Video Programs benefit from having a large audience, a significant impact, and a long history of promoting Chinese culture. Through a questionnaire survey and semi-structured follow-up interviews with 140 international students at a university in Tianjin and statistical analysis of the data using SPSS software, it was found that diversity and fun are the greatest expectations of international students for the content of Chinese Video Programs. This study also found that rationalizing the length of supplemental instructional videos in the classroom and providing more incentives for learning are very helpful in promoting international students' Chinese culture learning.

Keywords: Teaching Chinese as a Foreign Language in the Classroom, Cultural Teaching, Chinese Video Programs, Learning Motivation, Teaching Effectiveness

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Introduction

Since 2020, Chinese language education has been flourishing all over the world (Lou et al., 2022), and multimedia technology has been rapidly applied in the cultural teaching page of foreign Chinese classrooms (Nie, 2023; Singh and Kaur, 2023). Chinese Video Programs as media teaching resources are very helpful to international students' Chinese learning, and with the increase of international students' learning demand (Chen and Yuan, 2023), it is necessary to find the real demand and future expectation of international students for Chinese Video Programs.

In this paper, we conducted a questionnaire survey and follow-up interviews with 140 international students at a University in Tianjin. 73% of the international students were supportive of the application of Chinese Video Programs into classroom teaching, and they preferred to watch such programs in speaking classes and general classes. In terms of program content preference, international students prefer topics such as daily life and sports, prefer vocabulary and cultural knowledge, and hope to practice listening and speaking skills through Chinese Video Programs. This paper provides feasible suggestions on how to apply Chinese Video Programs into foreign Chinese classroom teaching in terms of topic preference, content selection, teaching principles and format expression.

1   Literature Review

1.1 Studies About Chinese Video Programs

Chinese Video Programs are local TV programs developed in China, mainly for foreigners, with Chinese language and Chinese culture as the main teaching content. In terms of research perspectives, scholars have gradually chosen to study a wide range of perspectives, including various aspects of communication content, communication forms and audiences (Zhang and Tsung, 2021; Han et al.,2023); in terms of research objects, including studies on Chinese language teaching borrowed from domestic Chinese TV variety, entertainment, history and culture programs(Repnikova, 2022), as well as comparative studies on Chinese language teaching in selected foreign and domestic TV programs (Hu, 2022), which all of them greatly promote the progress of Chinese Video Programs production in China and provide many inspirations for teaching Chinese as a foreign language in the classroom.

1.2 The Necessity and Feasibility of Chinese Video Programs to Assist Cultural Teaching in Foreign Chinese Classrooms

There is a two-way borrowing relationship between TV programs and teaching Chinese as a foreign language, and TV programs borrow from classroom teaching to maintain the "classroom feel" of the programs (Lin, 2020). According to the theory of audiovisual teaching, classroom teaching should focus on the overall perception and the combination of language and situation (Nicolaou et al., 2019). The cultural adaptation hypothesis emphasizes the importance of providing learners with a linguistic and cultural environment to help them reduce the "psychological distance" and "social distance" in the process of second language acquisition (Bierwiaczonek and Kunst, 2021). The above theories have laid the theoretical foundation and provided practical guidelines for the introduction of Chinese Video Programs into foreign Chinese classrooms.

2   Method

The present study combined quantitative and qualitative research methods by using both a questionnaire survey and interviews, in the hopes that triangulation of the data would be achieved and fascinating insights into the statistical patterns would be gained (Foster, 2023; Lin et al., 2023).

2.1 Participants

140 questionnaires were collected, 132 of them were valid (8 were invalid), with a recovery rate of 100% and an effective rate of 94%. International students from 44 countries participated in the survey, including 24 countries in Asia, 11 countries in Africa, 3 countries in Europe, 3 countries in America and 3 countries in Oceania (Table 1).

Among Asian countries, Cambodia has the most international students with 17, followed by Malaysian international students with 13, and the third largest international student country in Asia is Pakistan with 11, which is closely related to Chinese big geopolitical and Belt and Road strategic layout. In terms of gender ratio, the data from this questionnaire shows that there are 91 males (68.94%) and 41 females (31.06%), with a male to female ratio of about 7:3. In terms of the native language background of international students, the largest number of students are from Indo-European, South Asian and Sino-Tibetan languages, accounting for 47.73%, 14.39% and 12.12% respectively. The number of students from Semitic and Altaic languages is almost the same, with 15 and 14 students respectively, and the least number of students from Bantu and South Island languages, with 3 and 2 students respectively.

Table 1: International students' native language background

Language System	Number	Percentage
Indo-European Languages	63	47.73%
South Asian languages	19	14.39%
Sino-Tibetan Languages	16	12.12%
Semitic languages	15	11.36%
Altaic languages	14	10.61%
Bantu languages	3	2.27%
South Island Languages	2	1.52%
Total	132	100%

2.2 Design

The design of this study consisted of two parts: a questionnaire and a semi-structured follow-up interview. The questionnaire consisted of two parts. The first is the basic information of the respondents. The second is the main part of the questionnaire, which consists of multiple-choice and question-and-answer questions about the application of Chinese Video Programs. Semi-structured interviews were conducted after the questionnaire to compensate for any neglect of the open-ended questions at the end of the questionnaire by the participants or to add any incomplete description of their experiences.

2.3 Data Analysis

SPSS and statistical scales were used to obtain the real needs and future expectations of international students at Tianjin University for Chinese Video Programs to supplement classroom cultural teaching.

3   Results

In general, international students have a positive attitude toward the application of Chinese Video Programs into the teaching of culture in Chinese as a foreign language classroom. They want to see 6-10 minutes of Chinese Video Programs in speaking and general classes, and in terms of program topics, they prefer topics such as daily life and sports. The following is an analysis of the specific details of the introduction of Chinese Video Programs into the teaching of culture in the foreign language classroom.

3.1 International Students' Motivation to Learn Chinese

Motivation is an intrinsic drive that motivates an individual to engage in a certain behavior, often expressed as a desire to exert effort to achieve a certain goal (Turkpenova, 2023). In this survey, the corresponding options of integrative motivation, instrumental motivation and achievement motivation were set (Atkinson, 1981; Gardner, 1985). The main motivation for international students to learn Chinese is mainly integration motivation (Table 2), among which 72 students want to learn Chinese culture (54.55%), while life communication is also the main purpose for international students to learn Chinese (50%). In contrast to integration motivation, instrumental motivation is an important trigger for second language learners to improve their language proficiency in the short term, with 73 students (55.3%) and 44 students (33.33%) having a need to learn and work. This reveals that Chinese language teachers should guide students to maintain an appropriate level of motivation for learning in their daily teaching and provide timely encouragement and rewards.

Table 2: International Students' Motivation to Learn Chinese

Purpose of learning Chinese		Number	Percentage
Convergent Motivation	Cultural Interests	72	54.55%
	Life Interaction	66	50%
Tool-based motivation	Learning Needs	73	55.3%
	Work Needs	44	33.33%
Achievement Motivation	Improve language skills	74	56.06%
Others	/	12	9.09%
Total	/	341	/

In terms of the duration of Chinese learning (Table 3), the chi-square test was used to study the difference between the duration of Chinese learning and Chinese proficiency, and it was found that the duration of Chinese learning was closely related to Chinese proficiency. The percentage of international students who have studied Chinese for one to two years is 21.62%, which is significantly higher than the average of 12.88%. The percentage of international students who have been studying Chinese for one to two years who have obtained HSK level 4 is 21.62%, which is significantly higher than the average of 14.39%. The proportion who has studied Chinese for one to two years to get HSK5 is 40.54%, which is s higher than the

average level of 31.06%. The proportion who has studied Chinese for more than two years taking HSK5 is 36.92%, which is significantly higher than the average of 31.06%. The percentage of international students who have studied for more than two years and have taken HSK6 is 40%, which is significantly higher than the average of 21.97%.

Table 3: Chi-square test between Chinese learning duration and proficiency

| Title | Level | Learning duration | | | Total | χ^2 | p |
		Less than one year	One-two year	More than two years			
	HSK1	12(40.00)	1(2.70)	0(0.00)	13(9.85)		
	HSK2	9(30.00)	2(5.41)	2(3.08)	13(9.85)		
Chinese	HSK3	3(10.00)	8(21.62)	6(9.23)	17(12.88)		
proficiency	HSK4	4(13.33)	8(21.62)	7(10.77)	19(14.39)	84.153	0.000**
	HSK5	2(6.67)	15(40.54)	24(36.92)	41(31.06)		
	HSK6	0(0.00)	3(8.11)	26(40.00)	29(21.97)		
Total		30	37	65	132		

*$p<0.05$ ** $p<0.01$*

It was founded that native language background, age, learning environment and other factors all affect the effectiveness of Chinese language learning for international students, but the length of Chinese language learning is one of the more significant factors. Therefore, if international students want to improve their Chinese language proficiency and pass HSK level 3 or above, they can only do so by learning Chinese for a long time.

3.2 International Students' Preferences for Topics and Content of Chinese Video Programs

In terms of topic preference, topics about daily life were the most popular among international students, with 97 people (73.48%), and topics about work and study were the second most popular choice, with 63 people (47.73%). Topics on hobbies and interests were also popular among students, with 61 people (46.21%), while traditional culture programs were of interest to 58 people (43.94%).
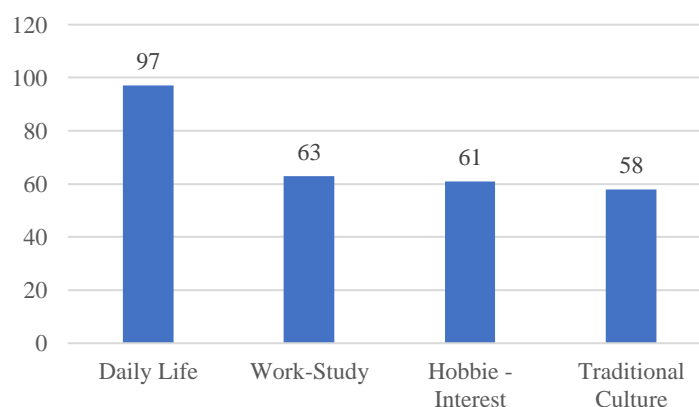
Figure 1: Theme preferences for Chinese Video Programs

When asked what help you would like the Chinese program to bring to you (Figure 1), 97 people wanted to practice listening through watching the Chinese program (73.48%).

Understanding traditional Chinese culture and learning more practical conversations through the program were 86 and 85 respectively, indicating that the cultural needs for watching the program and the practical life application needs are equally important (Figure 2). Language is a tool for human communication, and the goal of language learning is to use the language learned. Therefore, the practice of listening and speaking is a unique advantage of Chinese Video Programs. 17.42% of them hoped that the viewing of Chinese Video Programs would give them more flexibility in their learning time. The large volume and wide coverage of short videos are ideal for expanding students' horizons.
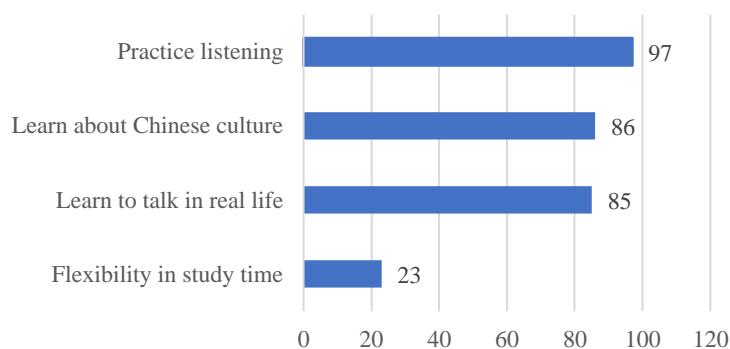
Figure 2: Content Preference of Chinese Video Programs

3.3 International Students' Suggestions on the Use of Chinese Video Programs in Teaching

The use of multimedia and other assistive technologies in the teaching of Chinese as a foreign language and culture not only integrates pictures, texts, sounds and images, but also makes the teaching and learning activities more colorful, and can combine knowledge learning and skill training with vivid and lively images, thus stimulating students' enthusiasm and learning efficiency in Chinese language learning（Figure 3）. When asked whether the use of Chinese Video Programs in classroom teaching could improve classroom learning efficiency, 98.48% of the international students chose yes, while two chose no and gave reasons: one person could not understand the meaning of the program because the current Chinese learning time was too short, and the other thought the speed of the program was too fast.
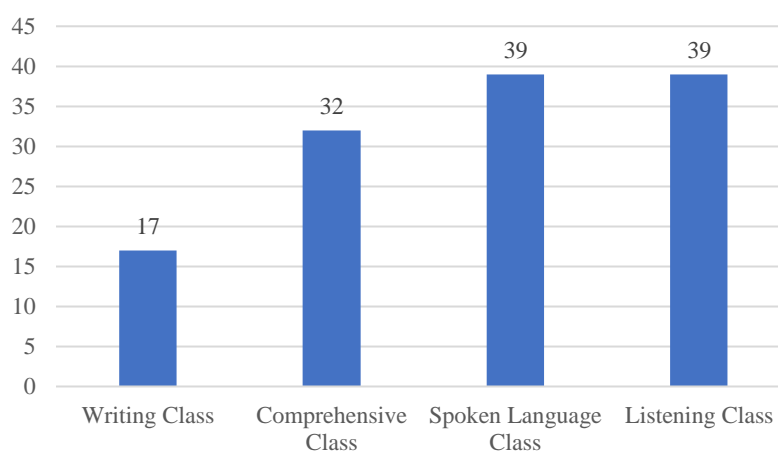
Figure 3: Applicable class types of Chinese Video Programs

In the survey on the pedagogical role of Chinese Video Programs (Figure 4), 74.24% of the international students thought they had an outstanding pedagogical role in teaching culture, and 67.42% thought they had a significant pedagogical role in teaching vocabulary. The number of international students who thought Chinese Video Programs had a pedagogical role in Chinese characters and grammar was 67 and 63. Chinese character learning and grammar learning are inherently difficult for international students, and the teaching aspect should introduce appropriate teaching aids to enhance the teaching of Chinese characters and grammar. Through the survey results, only 37.12% of international students think that Chinese Video Programs are useful in teaching Pinyin, and 12 others chose other options.

When asked how long they thought it was appropriate to watch Chinese Video Programs in class each time, 47 chose 6 to 10 minutes, accounting for 36%, 45 chose 11 to 15 minutes, accounting for 34%, 20% of international students chose to watch Chinese Video Programs of more than 16 minutes, and 13 thought it was appropriate to watch programs of 0 to 5 minutes, accounting for 10%. According to the guidelines for teaching Chinese as a foreign language, classroom teaching can use videos under 10 minutes (Figure 5).
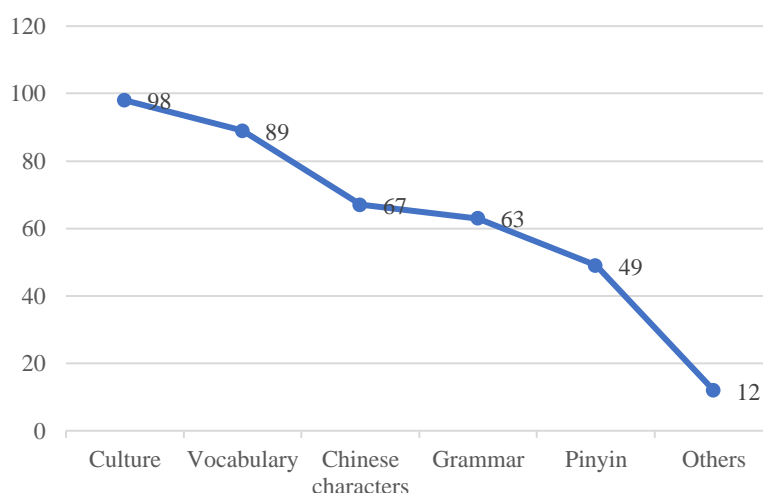
Figure 4: Teaching Expectations for Chinese Video Programs
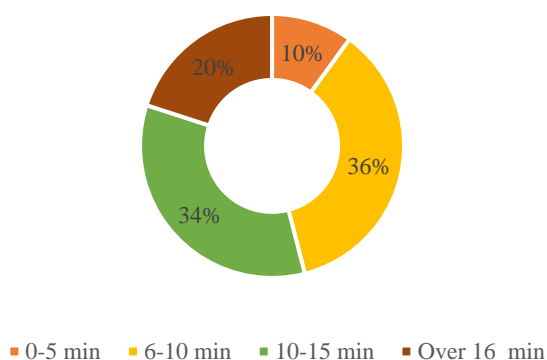
Figure 5: Duration of Chinese Video Programs

4   Discussion

Chinese Video Programs, as traditional TV media, have the characteristics of long development time and good mass base. It has formed a stable and good development model with strong content productivity, very high quality, and special professionalism, a standard production process, and a more obvious one-way and linear trend in communication, but the disadvantage is that the interactivity is relatively low. When asked about the advantages of Chinese Video Programs (Table 4), 65.91% of them think that Chinese Video Programs are more systematic in their knowledge introduction, while 44 feel that compared to short video Chinese introduction, Chinese Video Programs have more stable broadcasting platform and broadcasting time, 31 think that large TV programs and Chinese events have corresponding reward and incentive mechanism, which that short-form video programs cannot do.

Table 4: Comparison of Chinese Video Programs and short video programs

Comparison of Chinese Video Programs and short video programs					
Advantages	Number	Percentage	Disadvantages	Number	Percentage
More systematic knowledge introduction	87	65.91%	Lack of entertainment	53	40.15%
Better program settings	72	54.55%	Too much study time	52	39.39%
More stable broadcast platform and time	44	33.33%	Lack of instant interaction	49	37.12%
Rewards and incentives are available	31	23.48%	Slow update	44	33.33%
Others	1	0.76%	Others	3	2.27%

To obtain more in-depth data, this survey conducted follow-up interviews based on the analysis of the preliminary results of the questionnaire, to facilitate the organization of the results, the five interviewees are indicated by A1 to A5.

> Question: Which part of the Chinese program setting interests you the most?
> Answer:
> > A1: Life and entertainment. Prefer videos that introduce the details of Chinese people's daily life.
> > A2: Videos that introduce cultural differences, introduce culture, and are the most updated.
> > A3: Introducing daily life.
> > A4: Prefer life videos, especially about life in modern China, to help understand the popular culture and trends in China, and to make it easier for international students to adapt to or understand life in China in advance.
> > A5: Prefer travel and scenery, prefer daily life, which can be closer to daily life and will help us understand the latest Chinese terms and trends.

According to the interview transcripts of the five interviewees, they tend to prefer video programs on daily life and entertainment topics and are more interested in the contemporary development and introduction of China, including Chinese culture and lifestyle. In terms of video programs, they prefer videos that are updated quickly and have popular elements that

meet the aesthetics and tastes of the public. At the same time, if Chinese Video Programs want to develop better and become more popular, they need to keep up with the contemporary development and changes in China, keep up with the popular trends in time, and meet the learning and aesthetic needs of the younger generation.

5   Conclusions

At the end of the survey, 79 people gave specific suggestions for the introduction of Chinese Video Programs into the cultural teaching of foreign Chinese classes. Twenty-eight of them thought the Chinese Video Programs were helpful to their Chinese learning and encouraged the programs. 14 of them wanted the Chinese Video Programs to be more interesting and to include more laughs to enhance the entertainment of the programs. 7 of them wanted the programs to include more topics about daily life and sports, 6 of them thought the frequency of the Chinese Video Programs should be accelerated and hoped they would be updated continuously. 6 of them suggested 3 people want to learn more Chinese vocabulary and grammar from the program to help their daily Chinese learning. 2 people want the program to be shorter to make it easier to watch in their leisure time. 2 people suggest adding Pinyin and or English to make the program more. They suggested adding pinyin and or English to make the program easier for beginners to understand. Two people wanted to introduce more foreign guests to tell their own stories about learning Chinese, and to show more local cities and people's lives. Two people wanted to introduce Chinese Video Programs as a supplement to classroom teaching, and two people wanted the program to be broadcast on more platforms so that more international students could watch it. One international student from Slovakia said he wanted the program to be more popular in his country. One international student from Slovakia suggested that he would like the program to be more popularized in his country.

From this research, international students' suggestions for Chinese Video Programs include: in terms of content, more daily life and sports themes should be included to enhance the fun of the programs; in terms of promotion, the programs should follow the pace of the times and use more channels to promote the programs to enhance the popularity of the programs; in terms of format, stories and Chinese learning should be told through the perspective of foreigners themselves to enhance the interactivity of the programs. Chinese Video Programs are a good helper for international students to learn Chinese. If we make good use of Chinese Video Programs, Chinese learning will become easier and more accessible.

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Using Team-Based Learning for Post-graduate Training: Challenges and Solutions

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Abstract

Introduction: Available evidence demonstrates that Team-Based Learning (TBL) enhances teacher-learner interactions, solves cognitive gaps, connects concepts, and builds critical thinking. Nowadays, TBL become a popular approach in undergraduate training (UGT). Surprisingly, only a few institutions implemented TBL into their post-graduate training (PGT) programs. UGT and PGT differ in their educational ecosystem, learning goals, and learner characteristics. Attempting to use TBL in PGT (TBL-PGT) requires adaptations to these differences. There are few conducted studies on TBL-PGT. Most discuss the possibility of using TBL in specific courses and do not discuss technical issues. We also experience challenges during our experiential TBL-PGT course. This paper aims to clarify TBL-PGT characteristics, identify potential challenges and discuss suitable solutions.

Methods: We search papers on TBL-PGT, identify technical issues and discuss potential solutions.

Results: To date, no systematic use of TBL in any post-graduate programs. All TBL-PGT attempts were experiential. The authors agreed that TBL could be part of the PGT program and that implementing TBL-PGT requires suitable adaptations. Experiences from experiential TBL-PGT affirm the crucial role of adapting course design to the particular PGT educational ecosystem, the complexity of knowledge, and the ability to link new concepts to real-life activities. We identify factors that might influence the TBL-PGT program outcomes, which include involving experts, enhancing learner accountability, building teams, determining educational goals, configuring assessments, preparing learning material, formulating authentic applications, training facilitators, and organizing in-class activities.

Conclusions: TBL is suitable for PGT. It promotes certain advantages. However, curriculum developers should consider adaptations while implementing TBL-PGT.

Keywords: Team-Based Learning, Post-graduate Training, Outcome-Based Education

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Introduction

In the early 1980s, Larry Michaelsen developed a new approach to teaching-learning that allowed profit the benefits of small-group learning within large classes. This educational approach was very close to the structure that Team-Based Learning (TBL) classrooms use today. Decades later, several US institutions implemented TBL as part of their core curriculums. In the early 2010s, TBL became a popular educational approach. Several educational settings worldwide, including high schools and universities, introduced TBL into their training programs.

Nowadays, the Team-Based Learning TM Collaborative (TBLC) defines TBL as "an evidence-based collaborative learning teaching strategy designed around units of instruction, known as "modules," that are taught in a three-step cycle: preparation, in-class readiness assurance testing (RAT), and application-focused exercise (APP). A class typically includes one module" [8].
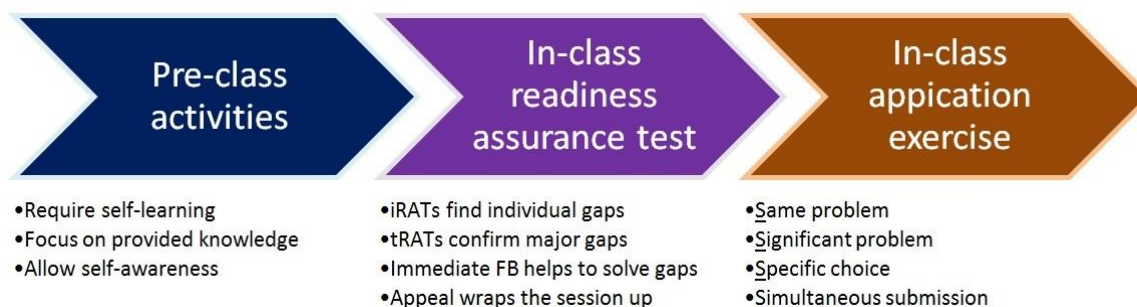
Figure 1: The three steps of Team-Based Learning

By flipping the classrooms, TBL allows beneficiaries to avoid wasting time on in-class speech, so it promotes gaining time. This precious time gained is crucial for ensuring active learning. According to available evidence, TBL effectively enhances teacher-learner interactions. Published works also demonstrate that TBL helps learners effectively solve cognitive gaps, connect learned concepts, and think critically [6, 7].

Unlike the case of undergraduate training (UGT), only a few institutions implemented TBL into their post-graduate training (PGT) programs. The number of publications concerning the use of TBL in post-graduate training (PGT) is quite limited. There are few conducted studies on the use of TBL in PGT (TBL-PGT). Those papers mainly discuss the possibility of using TBL in specific courses rather than its potential technical issues.

Therefore, this paper clarifies findings that concern the use of TBL in PGT, identifies potential challenges, and discusses suitable strategies for solving them.

Methods

We searched affiliated journals of the BEME, the IAMSE and the AMEE for published works on using TBL in PGT, using "team-based learning" and "post-graduate training" as keywords. Found papers were retrieved and reviewed. The revision focused on the type of implementation, potential challenges, and the author's suggestions. These potential challenges and propositions were retrieved and used as subjects of discussion.

Because of the limited number of published works, we could not apply any statistical methodology for analyzing data. Consequently, we decided to perform direct analysis and comparison instead of quantitative or qualitative analysis. Retrieved issues were also compared with UMP's current practices.

Results

We found only five papers which directly discuss issues related to the implementation of TBL in PGT. These five are published by McMullen (Medical Teacher, 2014) [4]; Travis (Teaching of Psychology, 2016) [9]; Graham (Medical Science Educator, 2020) [1]; Xue (Nurse Education Today, 2021) [10]; Nandamudi (Journal of Interprofessional Education & Practice, 2022) [5].

Table 1: Brief description of published papers on PGT-TBL				
Author	**Year**	**Disciplines**	**Implementing type**	
McMullen	2014	Psychiatric	Experiential use	[4]
Travis	2016	Introductory Psychology	Experiential use	[9]
Graham	2020	Transfusion medicine	Experiential use	[1]
Xue	2021	Nursing	Comparative study	[10]
Nandamudi	2023	Dysphagia interprofessional collaborative	Pilot study	[5]

Papers Revision

The revision of these papers found that, to date, only a few institutions implemented TBL in their PGT curriculums. All of these uses of TBL in PGT were experiential and partial. There was no systematic use of TBL in any post-graduate programmes. Preliminary works on the experiential use of TBL in PGT have shown controversial opinions.

Graham ran three transfusion medicine sessions adhering to TBL principles. She demonstrated that TBL is effective and enjoyable. She also mentioned that preparation should be adequate, and team continuity is poor despite 'compulsory' education sessions [1].

McMullen converted a didactic module of lectures into a TBL module for psychiatric residency training. She concluded that her attempt to introduce TBL into her residency training programme was successful. She considered involving TBL experts, reinforcing pre-class preparation and avoiding excessive pre-session assignments as keys to making TBL more relevant [4].

Travis studied the influence of team-based learning (TBL) methods on exam performance and student satisfaction in her PGT class on introductory psychology. She demonstrated that students in the TBL sections performed significantly better on items that tested the content covered in the TBL modules. She concluded that TBL is more effective than lecture in contributing to learning among introductory psychology students without negatively impacting course satisfaction [9].

Xue compared the effect of TBL on post-graduate nursing students with lecture-based teaching with small group discussion (LBTWSGD) and aimed to clarify potential factors that promote the effectiveness of TBL. Xue concluded that TBL effectively improved self-

learning ability and classroom engagement. Xue also mentioned the importance of clear and definite reading assignments in TBL. Quality RAT helped students obtain effective teacher feedback and ensured the effectiveness of discussion and communication [10].

Nandamudi studied the impact of the effectiveness on teaching collaborative practice (in dysphagia intervention) by conducting a TBL-based training in interprofessional education (IPE). She concluded that there was a strong positive influence on achieving the four core competencies [5].

In brief, these five authors agreed that TBL could be part of a residency/post-graduate training programme. On the other hand, McMullen, Graham and Xue shared that appropriate adaptations are the key to implementing TBL in PGT [4, 1, 10].

Experiential Use of TBL for PGT at UMP

In 2017 we built up and started a PGT course based on TBL. It was a course on reproductive medicine. This integrated course included biology, physiology, biochemistry, embryology, endocrinology and gynaecology. At the end of this course, we invited learners to give us feedback. Learners presented positive feedback that concerns the teaching-learning approach. They also showed positive individual perspectives. In the two following academic years, we ran the same PGT credit but applied some modifications to the RAT.

To date, we experienced the impacts of the PGT educational ecosystem on TBL course outcomes. We also found that involving experts, preparing learning materials, defining RAT goals, composing authentic application situations and selecting facilitators should be considered for applying TBL for PGT.

Discussions

PGT is different from undergraduate training (UGT) in several particularities. The three main differences are the educational ecosystem, outcomes of learning and characteristics of learners.

In PGT, simulation-based activities become less important. Various workplace activities replace simulation and then feature PGT. Graduates learn by practising in real-life conditions. Several factors might impact learners' activities and efficacity of learning, such as facing real-life beings, interprofessional relationships and social responsibilities.

PGT focuses on Entrustable Professional Activities (EPA) and targets professional competencies. This approach aims to help learners reach the top three levels of the educational pyramid (shows, does, trusts). Through PGT, learners follow a process of metamorphosis from novice to competent via milestones. Bringing theory into daily practice, practising in real life, facing real issues, moving from knowledge-centred to human-centred feature PGT.

In general, PGT courses involve learners who come from different backgrounds. It makes the PGT learner population heterogeneous. This heterogeneity includes learner competencies and practical experiences. Learner characteristic also concerns their social status, learning accountability and learning dynamics.

Table 2: Characteristics of undergraduate training and post-graduate training		
	Undergraduate training (UGT)	**Post-graduate training (PGT)**
Targets	Knows; knows how; shows	Shows; does; trusts
Educational environment	Simulation-based training	Workplace-based training
Learning materials	Tailored applications	Real life events
	Standardized subjects	Real-life beings
Knowledge complexity	Simple, separate	Complex, linked
Outcome measurement	Pre-defined end-points	Milestone complex system
Validating criterion	Pass-fail criterion	Judgement and decision

The above particularities of PGT require suitable teaching-learning configurations. In TBL-PGT, the technical issue to be solved is "how to adapt the practice of TBL to PGT while still keeping the TBL principles?" Therefore, measures for implementing TBL-PGT should adapt to the PGT educational ecosystem, the complexity of knowledge and the ability to link new concepts to real-life practices.
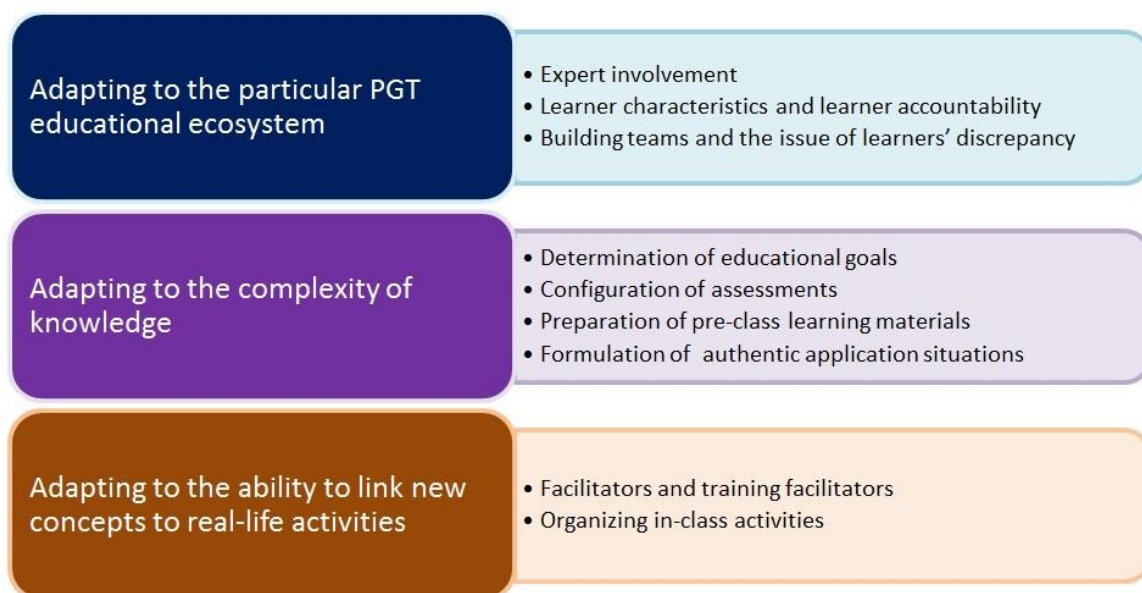
Figure 2: The three measures for implementing TBL-PGT

Adapting to the Particular PGT Educational Ecosystem

Three issues may relate to this subject. Those issues are expert involvement, learner accountability and building teams.

Expert Involvement

McMullen emphasized the importance of expert involvement in TBL course success [4]. UMP's practices reaffirmed this statement. In UGT, the participation of experts in the whole teaching process is not mandatory. Their primary roles are curriculum developers, course managers and learning material editors [2, 6]. Inversely, involving experts is a primary prerequisite for implementing TBL-PGT. Experienced experts make the core of human

resources for implementing the TBL curriculum in PGT. Practising in a real-life environment requires learners' competencies.

Therefore, PGT trainers should be experienced practitioners. Recruiting experienced trainers from all related domains becomes the top issue in preparing a TBL course for PGT. In TBL-PGT, experienced trainers should work together in the expert committee. This committee takes responsibility for designing course syllabi, ensuring assessments, preparing course agenda, composing learning materials, approving these materials and facilitating the TBL classrooms.

Learner Characteristics and Learner Accountability

McMullen emphasized that learner accountability should be reinforced [4]. The UMP also experienced the impacts of the lack of learner accountability on course outcomes and therefore made efforts to improve it. Learner accountability is a prerequisite learner characteristic. It conventionally includes a learning attitude and taking responsibility. In PGT, each learner differs from another in their social status, learning accountability and learning dynamics. This particularity might badly impact the TBL-PGT programme outcomes.

TBL-PGT course organizers must pay attention to the issue of learner accountability and seriously discuss this issue during the pre-course talk. Lack of accountability violates TBL classrooms. TBL practitioners should recognize the importance of this issue and perform strategies for accurately assessing learner accountability. Inversely the TBL process holds students accountable for coming to class prepared and working together as a team [1, 3].

Building Teams and the Issue of Learners' Discrepancy

Entrustable Professional Activities (EPA) and Interprofessional Education (IPE) feature PGT. Varieties of workplace activities dominate EPA's teaching-learning processes. In the workplace milieu, learners should perform their tasks in teams rather than individually. Their ability to work in teams becomes a mandatory requirement. Nandamudi considered that TBL-based training enhanced learners' ability to work together in IPE [5]. Travis confirmed this statement and showed empirical evidence, which suggests that TBL is a suitable pedagogical approach that enhances learners' ability to work in teams.[9] Unfortunately, these papers did not discuss learners' discrepancies in their backgrounds. Graham found that the team after-class continuity was poor, but she did not adequately explain potential hidden causes [1]. Learners' discrepancies include discipline, performance and experience. The UMP had faced the same discrepancy issue and had to solve it. The equality between teams in learner characteristics is one of the four principles of TBL. Different learner backgrounds lead to team heterogeneity that may influence the accuracy and effectiveness of team performance.

Consequently, course organizers should build identical teams. Deploying learners who have different learning experiences in equal groups should be respected. Once it meets the above requirement, TBL allows learners to improve their ability to work effectively together.

Adapting to the Complexity of Knowledge

Four issues may relate to this subject. Those are educational goal determination, assessment configuration, pre-class learning material preparation and formulation of authentic application situations.

Determination of Educational Goals

Conventionally, TBL is an approach which aims to teach theory basis in a single-disciplinary/multidisciplinary course. Undergraduates learn through understanding concepts and connecting them. In PGT, the teaching theory basis targets wide-ranging knowledge. In recent decades PGT began shifting its pedagogical approach, leaving multidisciplinary strategies and redirecting toward the universal implementation of interdisciplinary/transdisciplinary courses. The pre-existed boundary between subjects in multidisciplinary approaches becomes less indistinct in the interdisciplinary/transdisciplinary course. The learning contents usually have higher complexity and should be practice-oriented. Graduates often feel challenged while connecting wide-ranging concepts relating to various disciplines. For those reasons, conventional TBL might lose the ability to ensure its effectiveness in PGT. Changing the TBL course syllabi becomes crucial.

TBL course ELOs should target the ability to link ideas rather than focus on the ability to understand separate concepts or the ideas themselves. The above-discussed adaptations were subjects to explore in experiential uses of TBL interdisciplinary courses. It suggested that TBL-PGT allows for gaining advantages, and this approach contributes to putting learners at ease while simultaneously working on several topics. Nandamudi demonstrated that her TBL-based integrated module positively influenced helping learners achieve the four core competencies.[5] The UMP's experiential TBL-integrated course confirmed this statement.

Configuration of Assessments

The TBLC considers the RATs as double-purpose activities targeting assessment-of-learning and assessment-for-learning [1]. PGT-RAT is different from UGT-RAT in its aims. UGT-RAT aims to identify cognitive gaps, while PGT-RAT focuses on more complex competencies (connecting, applying, synthesizing, summarizing). As a formative assessment, PGT-RAT requires adapted changes to help graduates reach their learning goals. Bringing concepts together is one of the primary assessment goals in PGT. Moreover, graduates should be able to link ideas concerning different disciplines (integrating). Low-order thinking MCQs seem likely unable to meet PGT test blueprint requirements. Changing learner assessments is mandatory. PGT-RAT should target a higher level of knowledge, such as the ability to analyze/synthesize complex issues. Therefore, PGT-RATs require the replacement of low-order thinking MCQs with high-order thinking MCQs. Crafting high-order thinking MCQs needs writing experiences, both educational and professional. On the other hand, irrelevant PGT-RAT might "kill" in-class activities without helping learners find the right way to connect separate issues. Technically, composing relevant PGT-RAT is challenging.

Ideally, TBL trainers should work in an expert committee. To ensure the relevance of the PGT-RAT, this committee should identify the most common misunderstood reasonings, professional mistakes, and potential cognitive gaps and put it all into the PGT-RAT. Xue emphasized the need for relevant MCQs for teaching and assessing purposes in TBL-based PGT.[10] The UMP also recognizes this challenge. We experienced several difficulties when composing MCQs for PGT-integrated courses.

Preparation of Pre-class Learning Materials

Implementing TBL-PGT requires adapted learning materials. Provided documents should cover all key ideas which help learners build interdisciplinary connections. Those materials

should consistently develop ideas throughout several disciplines, directly target idea linkings, and constructively align (both vertically and horizontally) with designed ELOs. On the other hand, in the workplace milieu, even though learners are graduates, textbooks are not the first choice as practicable materials. Simplified, structured, oriented and learner-centred documents feature TBL materials. Avoiding potential learners' overload is also an important issue. Even though learners are graduates, the amount of the pre-class workload should not exceed the minimum required. Quality materials support learners to think critically throughout the learning process. McMullen [4], Travis [9] and Graham [1] shared the same idea on the importance of targeted learning materials. They emphasized that ensuring the constructive alignment between ELOs, assessments, and learning materials is a prerequisite to success in TBL-based PGT. UMP experienced the same consideration.

Formulation of Authentic Application Situations

The 4S is the icon of TBL. It includes four principles: working in teams, solving the Same assignment on Significant problems, selecting Specific solutions, and Simultaneous reporting (of team solution) [1, 3]. Application exercises for undergraduate training (UGT-APP) differ from application situations for post-graduate training (PGT-APP) in their learning goals. Most UGT-APPs are simulated exercises. The 4S-based application exercises help students connect separate learned elements and apply knowledge in simulated situations [3]. In PGT, the weighting of practical activities is high. Graduates learn through specialized, oriented training courses.

Consequently, PGT-APPs should focus on more complex and authentic subjects while still respect for the 4S principles. Replacement of solving simulated exercises with managing real-life situations features those courses. Application situations should not include invalid details. Removing them from the original issue is crucial, which ensures reaching ELOs. Graham demonstrated that PGT-APPs did not reach the same degrees of effectiveness throughout different abilities [1]. UMP's experiential TBL-PGT suggested that the PGT-APP should focus on initial acquisitions rather than advanced competencies.

Adapting to the Ability to Link New Concepts to Real-Life Activities

Two issues may relate to this subject. Those issues are the facilitators and the organization of in-class activities.

Facilitators and Training Facilitators

As conventionally described, there is neither a lecturer nor a lecture in TBL classrooms. In UGT, TBL facilitators are in charge of facilitating in-class discussions. They are not being responsible for delivering a course. Consequently, the in-class presence of experts is not a mandatory requirement [10]. Unlike UGT, the PGT in-class activities concern the highest degree of thinking also the ability to link concepts to real-life practices. McMullen suggested that the in-class presence of a proficient practitioner seems likely a primary requirement [4]. To date, the UMP has constantly followed this strategy. Besides, skilled facilitators are a prerequisite in all TBL classrooms.

Facilitators should be familiarized with TBL's philosophy, regardless of UGT-TBL or PGT-TBL. Unskilled facilitators might shoot the in-class discussion down [10]. Future trainers (even experts) should equip themselves with skills for preparing and conducting TBL. They

should regularly attend specific ToT on the ability to facilitate. Through that, they can improve the trainer-trainee interactions and enhance the effectiveness of discussion in PGT. McMullen considered training facilitators as a crucial part of preparation [4]. The UMP has constantly supported this consideration. To date, we conducted several ToT (training of trainers) workshops. This activity allowed us to make our facilitator team stronger.

Organizing In-Class Activities

Even though TBL is one of the various kinds of flipped classrooms, the TBL approach is very different from the other flipped classrooms. A typical TBL flow includes three consecutive steps: preparation before class, in-class RAT and in-class APP [1, 3]. The preparation phase includes all learner must-do activities before a class which mainly focus on self-studying provided materials. This phase aims to provide essential knowledge to learners and does not aim to find or solve their cognitive gaps. Even though the fact that graduates have an advanced background, self-learning is still a matter in PGT-TBL. McMullen and Graham experienced the impact of inadequate learner preparation on TBL-course outcomes [4, 1]. Graham emphasized the significance of the preparation phase in the TBL-based training and suggested conducting an opening talk for each course [1]. The UMP also faced and experienced this issue. For that, UMP constantly respected these recommendations.

The in-class RAT is the icon of TBL. PGT-RAT focuses on high-order thinking. On-target focused discussions and experienced trainers are the two factors that ensure the effectiveness of PGT-RAT. Discussions should treat interdisciplinary/transdisciplinary issues. Discussion should not focus on separate subjects. Even though the in-class presence of experts is mandatory, experts should keep being TBL-facilitator. Delivering speeches shot discussion down. Technically, we consider that facilitating is the most challenging TBL-PGT issue.

The in-class Application Exercise (APP) is also the icon of TBL. PGT-APP concerns transdisciplinary linked concepts. Experienced trainers are crucial to ensure the relevance of PGT-RAT. On the other hand, evidence-based solutions support graduates in enhancing critical thinking. Voting via coloured clickers, as classically described, becomes far to allow graduates to express complex solutions. Using various ways for reporting encourages learners to discuss more complex options. A poster gallery walk seems likely helpful for expressing complex solutions [1].

Conclusion

Available evidence confirms the effectiveness of TBL. Evidence also supports the use of TBL in PGT. Experiential works demonstrate that it is possible to introduce TBL into PGT. However, implementing TBL in PGT requires several adaptations to more complex educational goals. The difference in the educational ecosystem also requires appropriate changes. Paying attention to the impact of an educational ecosystem, involving experts in professional committees, carefully designing course syllabi, preparing appropriate learning materials, changing the way of writing RAT and applications, and involving trainers in ToT workshops are the most common issues which relate to the success of implementation TBL in PGT.

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Digital Inclusion Through Innovative Library Management Systems in Digital Libraries: Literature Study

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Abstract

Library management systems in digital libraries can bring about innovation in digital inclusion. Digital library users will find it easier to access reading materials anywhere and anytime, so the purpose of this study is to identify the effect of using a library management system in digital libraries on digital inclusion innovation. This research is the result of a synthesis of the findings of previous research articles that are relevant in the 2018-2022 period. This study adapted the Systematic Literature Review method with Publish or Perish software, then filtered and extracted the data according to the criteria for the research objectives so as to produce 54 relevant articles and compiled using the Prisma Protocol. From the results of several research syntheses, it was found that the use of library management systems in digital libraries is able to provide digital inclusion innovations. The topics in the articles obtained mostly explain the development of inclusive digital library management systems. Most of the systems used are user interface applications. In addition, the use of the library management system has a positive impact in the form of increasing inclusive services for users. Future research is expected to be able to present in detail the influence of the library management system on digital libraries to develop digital inclusion that is more friendly for persons with disabilities.

Keywords: Digital Inclusion, Library Management System, Digital Library

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Introduction

ICT's development impacts various aspects of life, but not all individuals and groups can fully utilize it due to the digital divide.(W. Wan Abdullah, F. Ahmad, 2018).The International Telecommunication Union reports that only around half the world's population has internet access (ITU, 2020). The digital divide affects access to libraries, essential institutions for community information, knowledge, and education (Edmund T Cabellon, 2016). Libraries and information are two things that are interconnected and cannot be separated (Hasugian, 2009). The library has a very important role and contribution to the experience of students because the library is something that continues to connect with students in terms of meeting student needs (Kezar A, 2006). Libraries have adapted to the digital age, expanding online services, resources, and operating hours to better connect with students and ensure accessibility. (Kezar A, 2006; Snavely, 2012). Indonesia has a remarkably low interest in reading, as indicated by UNESCO's research, with only 0.001% engagement, but libraries can play a crucial role in improving this situation. (Perpusnas., 2021). Libraries, when utilized effectively, can serve as hubs for scientific development, discussions, and knowledge acquisition (Setiawan & Nuryana, 2020). Digital libraries aim to provide broader access to books and reading materials, but limited skills hinder some individuals, highlighting concerns about the digital divide and inequality. (F. Riggins, 2005; Parsons & Hick, 2008; Robinson et al., 2015). Digital inclusion is crucial for supporting individuals and communities in the digital age, addressing the pressing issue of the digital divide, and fostering societal development (Nguyen, 2020). Digital inclusion is also a determining factor for social inclusion (Alam & Imran, 2015; Helsper, 2012; Ragnedda, 2017; Warschauer, 2002). Digital inclusion refers to policies that address the digital divide, promote digital literacy, and reach out to underserved populations (Jaeger et al., 2012).

Library Management Systems (LMS) facilitate digital inclusion by transforming traditional libraries into digital ones through innovative management systems. (Shanmugam Ap Palanigounder, Ramalakshmi Arunachalam, 2020). Library management systems are vital for equitable access to libraries, supporting collection management, borrowing, inventory, and administrative tasks. Adopting these systems enhances operational efficiency, record accuracy, and overall patron service. Subramanian and Muthuraja (Subramanian, S., & Muthuraja, 2019) emphasized the importance of digital library management systems for organizing and accessing knowledge efficiently. Automated library management systems enhance service efficiency, underscoring their importance in library operations (El Naggar, H., & Elsayed, 2020; Rai, S., & Singh, 2020). Digital inclusion in library management involves leveraging technology to enhance accessibility, dissemination, and management of information resources. Innovative library management systems enable more efficient and effective services through software, mobile apps, online platforms, and other technologies for information access, digital borrowing, and various library activities (Das, A., Dey, S., & Maiti, 2018). Innovative library management systems promote digital inclusion and expand student and community engagement by providing easier access, benefiting previously excluded individuals, including those in remote areas, with disabilities, or facing physical accessibility limitations.

Method

This research uses the Systematic Literature Review method to identify research topics related to digital inclusion through innovative library management systems and the impact of library management systems on digital inclusion. In Systematic Literature Review research, it

is necessary to identify as many previous studies that have been conducted in the field to be researched and which are most relevant to the research topic area, which is very important for its direction and methodology, so systematic screening is necessary.

Search Strategy

The screening of journal articles in this SLR research uses the help of PoP (Publish or Perish) software with data sources on Google Scholar. The filtered articles have a range of 2018-2022 (the last five years) with the selection of keywords digital library, digital library management system, and digital inclusion.

Publication Selection & Data Extraction

Based on the Prisma Protocol chart in Figure 1, the presentation of articles through the Publish or Perish search identified as many as 4920 articles. In the identification process, screening was carried out by eliminating articles that had never been cited so that 4797 articles were reduced. In the screening process, screening is carried out with criteria taken specifically for journal articles so as to exclude 4783 articles that are not included in the journal. Then, entering the eligibility assessment stage, there are two reasons; the first reason is to filter articles by determining the title of the library so that articles are filtered specifically for digital inclusion in articles with the word library only so that it is reduced to 125 articles. This was done because, in the database obtained by Publish or Perish, digital inclusion was found other than through the library. For the second reason, filtering was carried out with special criteria on journals that were cited more than ten times so as to better ensure the credibility of the article so that there were 54 articles that were reduced.
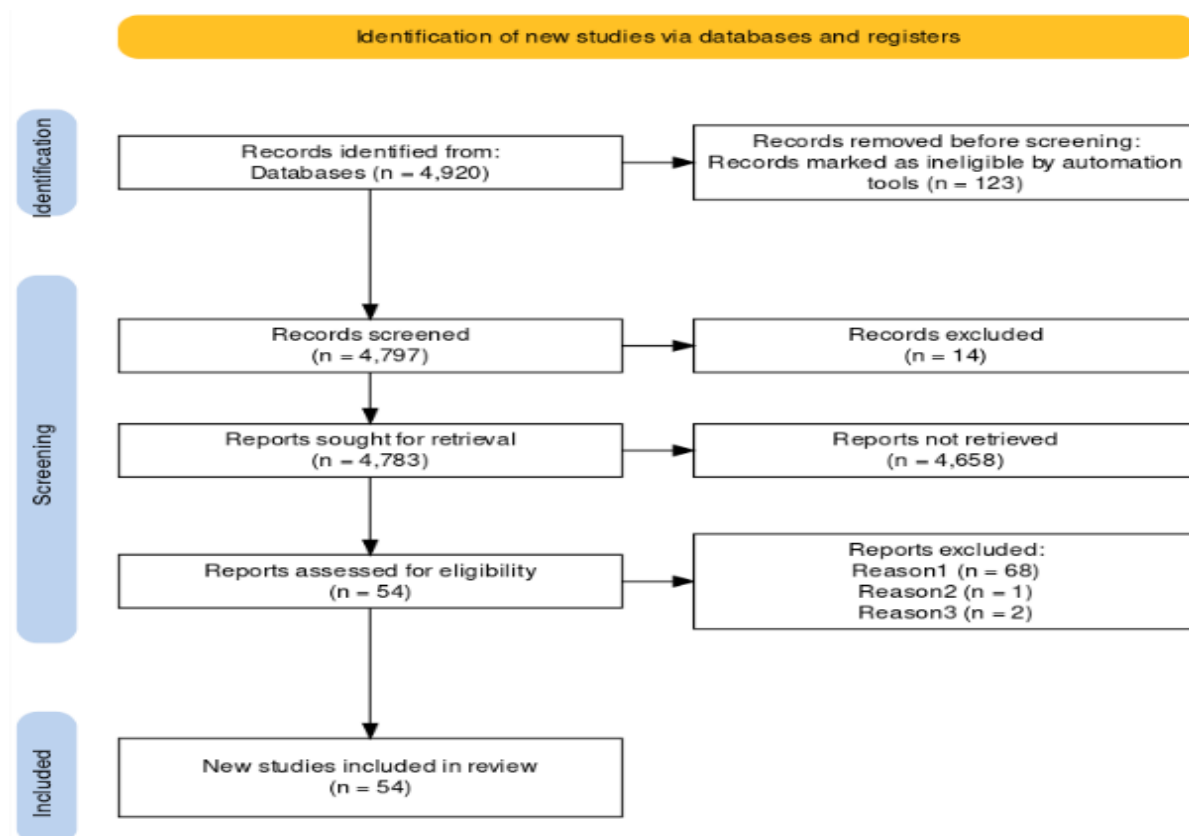
Figure: 1 PRISMA Diagram

Based on the entire screening series, as shown in the Prisma Protocol Chart, the final number of 54 articles related to the topic of digital inclusion through innovative library management systems was obtained. Thus, this research is directed to provide research results where the existing technology in the library management system can provide digital inclusion innovations to students in particular and the community in general in accessing the library and, in the future, can further develop technology in the library management system.

Result

Article Characteristics

In this SLR research, the final screening results were obtained from as many as 54 articles on the topic of digital inclusion through library management system innovation. The research articles were analyzed using VoSviewer software to find out the article keywords that often appear and other keyword associations. Analysis using VoSviewer can be seen through the keyword mapping shown in Figure 2.
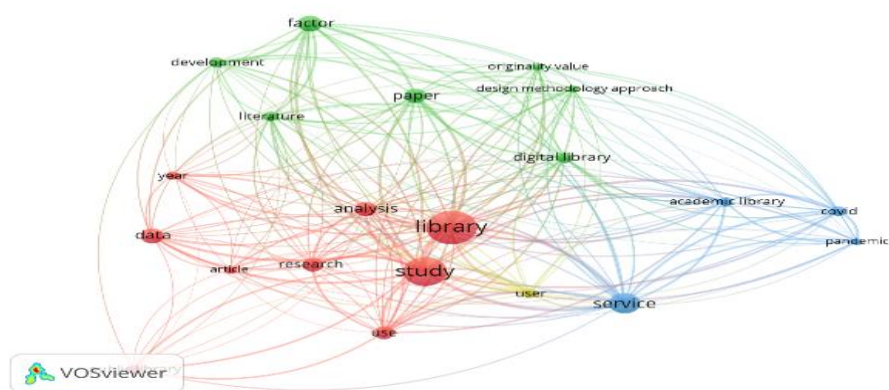
Figure 2: Obtained Article Keyword Mapping

Figure 2 it can be seen that the keyword about. In the research article, the distribution of each year can be shown through the graph in Figure 3.
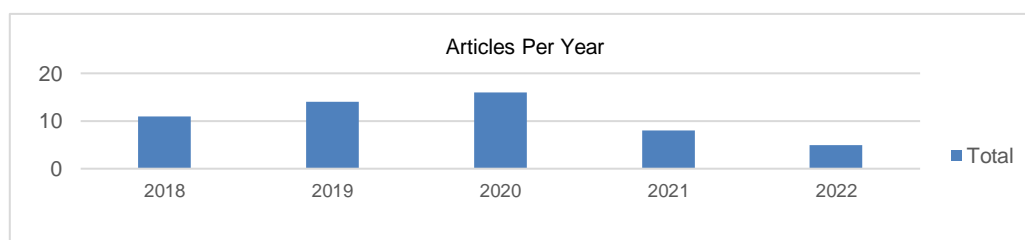
Figure 3: Distribution of Articles by Year

Based on Figure 3, it can be seen that most of the research articles obtained were published in 2020 and the least in 2022. The number of article citations obtained can be shown using the diagram in Figure 4.
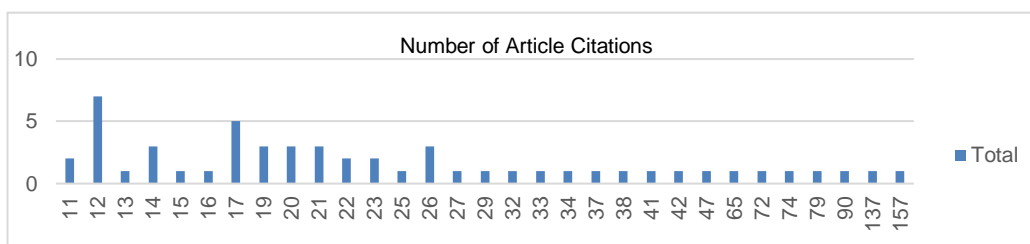
Figure 4: Number of citations of articles obtained

Based on Figure 4, it can be seen that the most cited article has 157 citations with a frequency of 1 article, while there are seven articles that have 12 citations. The distribution of journal publication sources and research articles obtained can be seen in the diagram below in Figure 5.
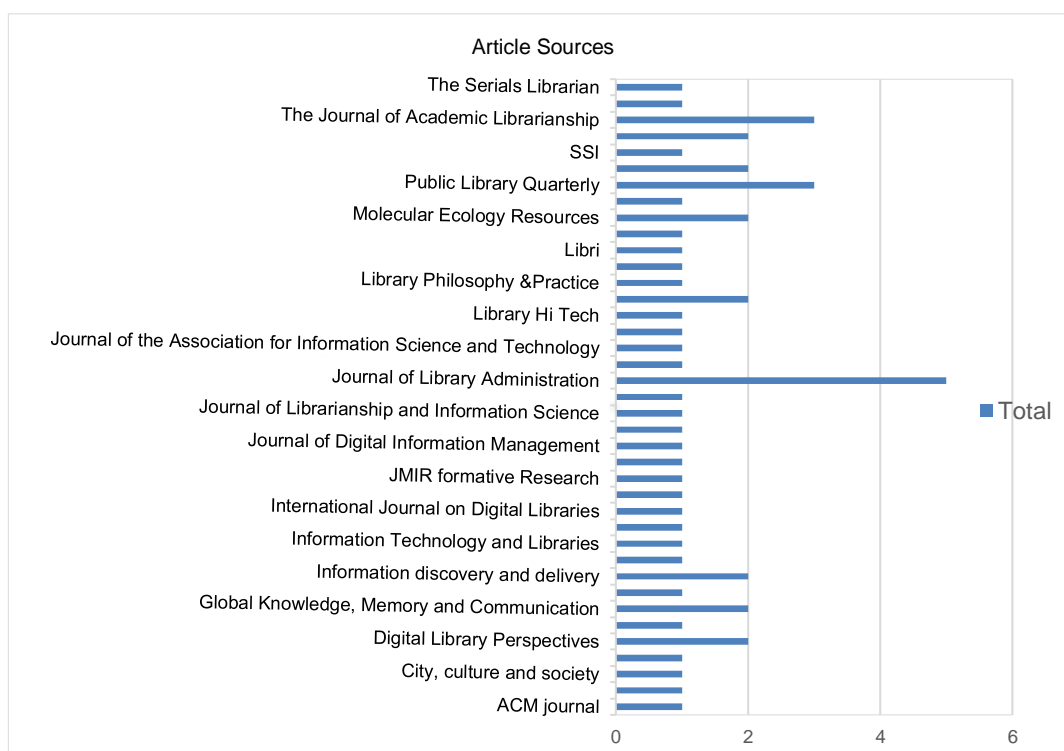
Figure 5: Distribution of Article Sources Obtained

Based on Figure 5, it can be seen that the distribution of the most sources of articles obtained from the Journal of Library Administration. Series as many as 4 articles. The distribution of article publications obtained can be illustrated with the diagram shown in Figure 6.
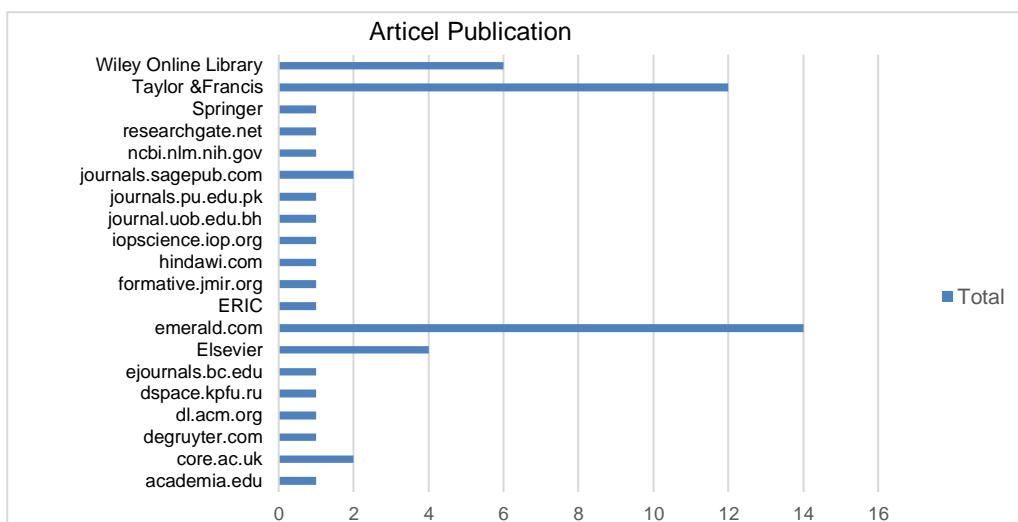
Figure 6: Distribution of Article Publications Obtained

Based on Figure 6, the distribution of the most article publications obtained is from Emerald.com, with as many as 14 articles.

Thus, it can be concluded that the characteristics of the articles obtained in the playback mostly carry the words Library, Service, and Digital Library most dominant in the articles obtained because they have a large circle, so it can be said that Library, Service, Digital Library, and Development with the most distribution of article years in 2020. The highest number of citations is 157 citations, and most articles have 12 article citations. From the acquisition of these articles, most journal sources come from the Journal of Library Administration with the most publications, namely Emerald.com.

Use of Library Management System

The use of library management systems in digital libraries is an innovation that can facilitate students and the community in accessing reading resources. With digitization, eating libraries today can also be accessed inclusively by anyone at any time. Based on the articles that have been obtained, the use of library management systems is often related to several topics shown in Figure 7.
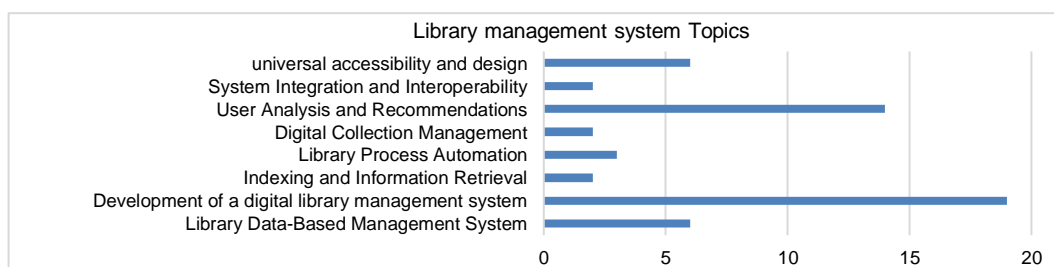
Figure 7: Library Management System Topics

Based on Figure 7, it can be seen that the most frequently implemented topics in library management systems are the topics of digital library management system development and user analysis and recommendations. The use of library management systems can support the needs of students and the community to access reading materials or books more easily and inclusively. Based on the articles that have been obtained, the form of presentation of the library management system can be shown through the diagram in Figure 8.
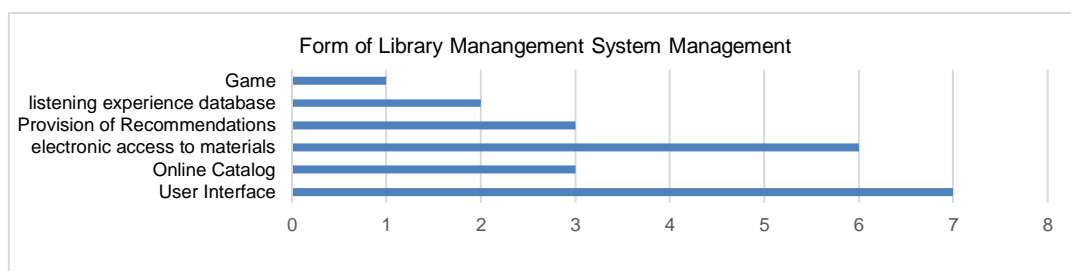
Figure 8: Form of Library Management System Presentation

Based on Figure 8, the presentation form of the library management system is often used in the form of a user interface and electronic access to materials.

The form of presentation of the library management system is adjusted to the needs and objectives of digital libraries to facilitate access to reading materials or books as a whole. The library management system in digital libraries is basically developed to further facilitate access to reading materials and books as a whole. The use of library management systems in digital libraries can provide an increase or impact on development and services to be more inclusive. Based on the articles that have been obtained, the library management system that can have a positive impact on digital inclusion can be shown through the diagram in Figure 9.
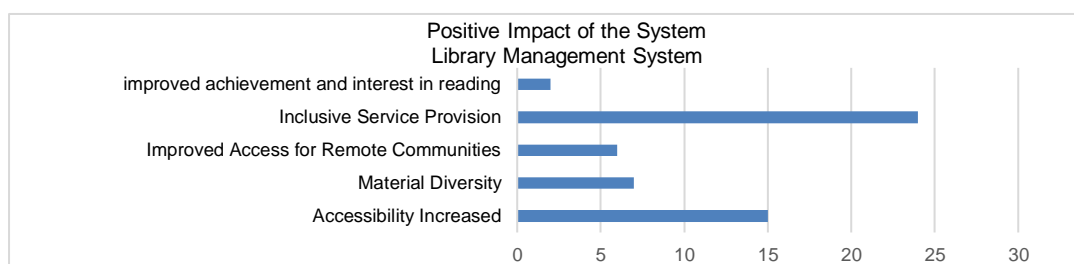
Figure 9: Positive Impact of Using the System Library Management System
in the Library Digital

Figure 9 shows that the use of library management systems in frequent digital libraries provides a positive impact on the provision of inclusive services and increased accessibility.

Therefore, it can be concluded that the use of library management systems in the digital library shows the topics that are often implemented in the system library management system development digital as well as user analysis and recommendations, with most forms of presentation done in the form of a user interface and electronic access to materials. System usage library management at the library Digital has several positive impacts that can be felt by various parties. The most positive feeling is inclusive service provision, and accessibility increased (A., 2013; Adamou et al., 2019; AlAwadhi & Al-Daihani, 2019; Beyene, 2018).

Discussion

Use of Management Systems Library in Digital Library

Library Management Systems act as a tool for changing traditional libraries to digital libraries (SHANMUGAM AP PALANIGOUNDER, RAMALAKSHMI ARUNACHALAM, 2020).[18] A library management system is important to ensure that all members of society can feel the same benefits from the library. This system plays a crucial role in collection

management, lending, inventory, and administrative activities in the library. By adopting a Library Management System, Libraries can increase operational efficiency, improve the accuracy of recording, and provide services better to visitors.

Subramanian and Muthuraja (Subramanian, S., & Muthuraja, 2019) emphasize the importance of management systems digital library to organize and access knowledge efficiently. An automated library management system helps improve internal efficiency and provides library services; this shows that this system is so important in the context of service library (El Naggar, H., & Elsayed, 2020; Rai, S., & Singh, 2020). The inclusion of digital in library management includes the use of technology to improve accessibility, dissemination, and management of information resources in the library.

Based on that article obtained, the use of management systems library in digital library covers several topics, namely systems library data-based management (Ahlfeld, 2020; Ashiq et al., 2021; Deja et al., 2021; Gahagan & Calvert, 2020; Ma & Lund, 2021; Velasquez & Evans, 2018), Management system development digital library (A., 2013; Adamou et al., 2019; AlexanElizarovder & Novikov, 2019; Ångqvist et al., 2019; Beyene, 2018; Bohmann et al., 2022; Desmarais & Louderback, 2020; Do et al., 2019; Dresel et al., 2020; Elizarov & Lipachev, 2020; Harlow & Hill, 2020; Morinière et al., 2019; Murphy et al., 2022; Peacock et al., 2020; Rafi et al., 2019; Rosman et al., 2020; Singeh et al., 2020; Wang & An, 2019; Waterman et al., 2020; Zheng et al., 2022), Library Process Automation (Desmarais & Louderback, 2020; Leorke et al., 2018; Mbambo-Thata, 2021). Analysis Users and Recommendations (A., 2013; Afthanorhan et al., 2020; AlAwadhi & Al-Daihani, 2019; Ali et al., 2021; Cox et al., 2019; Do et al., 2019; Isibika & Kavishe, 2018; Lediga & Fombad, 2018; Marineo & Shi, 2019; Ocran et al., 2020; Pionke, 2020; Rahimi et al., 2019; Rutherford et al., 2018; Samsuddin et al., 2020), System Integration and Interoperability (Darch et al., 2020; Potnis et al., 2020), accessibility and design universal (Chisita & Chizoma, 2021; Cleave & Geijsman, 2020; Glusker et al., 2022; Rysavy & Michalak, 2020; Sanchez-Rodriguez & LoGiudice, 2018).

Based on the article that obtained, it can be seen that the topic is most often implemented in library management systems is topic Management system development digital library; this is because Libraries, especially in schools or universities, are obliged to develop information technology to achieve learning objectives with developing a digital library technology based According to Deasy Lisa Damayant's study, Library management is very important. Digital library management begins with digital library planning, digital library budget funding, management of digital collections, management of human resources, monitoring and performance evaluation, analysis of obstacles, digital library management, and efforts to create a library management system that serves its aims to overcome them. Obstacle: Utilize digital libraries and build mutual relationships between librarians and students and teachers, with possible students and teachers accessing digital libraries more frequently (Damayanti et al., 2023).

The Form of Presentation of the Management System Digital Library

The form of presentation of the management system library is tailored to your needs and digital library purposes for easy access to reading materials or books as a whole. System library management at the library digital is basically developed for easier access to reading and books overall.

Based on that article obtained, the existing form of presentation in the library management system in a digital library is the interface users (Elizarov & Lipachev, 2020; Leorke et al., 2018; Mbambo-Thata, 2021; Nneji, 2018; Singeh et al., 2020; Wan Zahari Wan Yusoff and Maziah Ismail, 2008; Zheng et al., 2022), electronic access to matter (Desmarais & Louderback, 2020; Dresel et al., 2020; Lediga & Fombad, 2018; Mbambo-Thata, 2021; Rahimi et al., 2019; Velasquez & Evans, 2018), database listening experience (Adamou et al., 2019; Waterman et al., 2020), online catalog (AlexanElizarovder & Novikov, 2019; Rafi et al., 2019; Velasquez & Evans, 2018), games(Cleave & Geijsman, 2020), providing recommendations (Beyene, 2018; Bohmann et al., 2022; Murphy et al., 2022).

Based on the articles obtained, it can be seen that the form of presentation of the library management system that is often used is in the form of a user interface. Many user interface applications have been created, according to research conducted by Maulana Y. & Dian P.S., which makes the user interface of the CIRLIB Application (Cirebon Library) in accordance with the fulfillment of user requirements. The application is designed in the form of use case diagrams, action diagrams, and user interfaces. User interface design services include essential library information, book lending services, on-site reading services, e-books, and education (Yusuf & Sari, 2023).

The Positive Impact of Using the System Library Management for Digital Inclusion

Subramanian and Muthuraja (Subramanian, S., & Muthuraja, 2019) emphasize the importance of management systems digital library to organize and access knowledge efficiently. Automated library management system helps improve internal efficiency and provides library services; this shows that this system is so important in the context of service library (El Naggar, H., & Elsayed, 2020; Rai, S., & Singh, 2020). The inclusion of digital in library management includes the use of technology to improve accessibility, dissemination, and management of information resources in the library.

By implementing an innovative system of library management, libraries can provide more services efficiently and effectively to members of the public. Management system innovative library can involve the use of software, mobile applications, or online platforms for easy access and search information, borrowing and returning digital books, as well as usage of other technology to facilitate library activities (Das, A., Dey, S., & Maiti, 2018).

Based on that article obtained indicates that the use library management system on frequent digital library have a positive impact on inclusion digital is increasing accessibility (A., 2013; Ångqvist et al., 2019; Bohmann et al., 2022; Do et al., 2019; Kazuye Kimura, 2018; Leorke et al., 2018; Rutherford et al., 2018; Rysavy & Michalak, 2020; Singeh et al., 2020; Velasquez & Evans, 2018; Wan Zahari Wan Yusoff and Maziah Ismail, 2008; Wang & An, 2019), Material Diversity (Ahmad et al., 2018; Elizarov & Lipachev, 2020; Morinière et al., 2019; Nneji, 2018; Rafi et al., 2019; Wan Zahari Wan Yusoff and Maziah Ismail, 2008; Wittmann et al., 2019), inclusive service provision (A., 2013; Adamou et al., 2019; Afthanorhan et al., 2020; Ali et al., 2021; Anyim, 2019; Ashiq et al., 2021; Beyene, 2018; Chisita & Chizoma, 2021; Cox et al., 2019; Deja et al., 2021; Desmarais & Louderback, 2020; Glusker et al., 2022; Isibika & Kavishe, 2018; Ma & Lund, 2021; Mbambo-Thata, 2021; Peacock et al., 2020; Potnis et al., 2020; Rahimi et al., 2019; Rahmat & Saqlain Raza, Hasan Zahid, Jaffar Abbas, Fatimah Azzahraa Mohd Sobri, 2022; Rosman et al., 2020; Sanchez-Rodriguez & LoGiudice, 2018; Zheng et al., 2022), achievement and interest read increases (Cleave & Geijsman, 2020; Marineo & Shi, 2019).

Based on the article obtained, it can be seen that the management system used library in digital libraries often has a positive effect on the provision of inclusive services. Basic library services must continue to grow in inclusion to form a society that has access to complete reading materials easily, anywhere and anytime.

This is what Sudarmin et al (Damayanti et al., 2023) said. According to research, change-based library social inclusion is an effort to create an educated society in library and archival services. Enrekang Regency, through various strategies, involves librarians in active roles, politics publishing one. Order and the formation of synergistic teams, meeting stakeholders, launching Enrekang library, and organizing co-learning meetings. However, the Library and Archives Service Enrekang Regency also met some problems in developing a library based on social inclusion. Source limited budget resources and network Internet. The goal is to overcome obstacles by collaborating with various actors (Cleave & Geijsman, 2020; Marineo & Shi, 2019) at the state level, district, and private and to optimize the existing budget as well as possible.

Conclusion

From the presented information, it can be concluded that digital library management systems play a crucial role in transforming traditional libraries into digital entities, advancing service delivery, and resource management. The primary focus of this research is the development of digital library management systems, particularly in educational settings, utilizing information technology to achieve learning objectives and foster digital libraries. These systems come in various presentation forms, with user interfaces being the most commonly used. The implementation of these systems has a positive impact on digital inclusion by enhancing accessibility, diversifying materials, and providing inclusive services. Despite challenges such as resource limitations and internet connectivity issues, collaborative efforts with stakeholders can offer solutions. This research provides an in-depth understanding of how innovation in digital library management systems can enhance digital inclusion, broaden access, and advance learning and reading interests.

Acknowledgements

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Development of TPCK Creativity-Based Learning Model for Improving Grade 7 Students' Academic Achievement and Creative Thinking

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Abstract

Creativity-based Learning (CBL) is useful in developing several important skills for mathematics students. This research aimed to: a) develop the CBL integrated with Technological Pedagogical Content Knowledge (TPCK) or TPCK-CBL Model to teach mathematics for Grade 7 students; and 2) examine students' development of academic achievement and creative thinking in the Ordered Pairs topic after learning with the TPCK-CBL Model. The mixed-methods research design was employed in this study. The researchers collected both quantitative and qualitative data from 70 Grade 7 students, who enrolled in the first semester of the 2022 academic year at Thungsong School, Nakhonsithammarat province, Thailand. The TPCK-CBL Model and its associated lesson plans, the Learning Achievement Test and the Creative Thinking Test was validated by five experts. The results yielded that the TPCK-CBL Model could foster Grade 7 students' academic achievement and creative thinking. Through the engagement in open-ended tasks, students were encouraged to think critically, generate innovative solutions for mathematical problems from multiple perspectives. The use of technology in TPCK further supported the development of students' digital literacy and enabled them to utilize digital tools and software to further explore mathematical conceptions in fruitful ways. This study highlighted the significance in incorporating TPCK with CBL for teaching mathematics for Grade 7 students in Thailand. Through TPACK-CBL Model, mathematics educators can create learning environment that truly nurtures students' academic achievement and creative thinking. Implementing TPCK-CBL not only enhances students' mathematical knowledge but also equips them with the essential skills needed for success in the current digital age.

Keywords: Creativity-Based Learning, TPCK, Mathematics Education, Academic Achievement, Creative Thinking, Grade 7 Students

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Introduction

Education stands as an indispensable facet of human existence, a fundamental right that every individual should embrace. Its significance resonates through the tapestry of daily life, serving as a catalyst for holistic development. Education is a transformative force, shaping not only one's cognitive prowess but also fostering skills, nurturing mental well-being, and influencing various dimensions of personal growth. In the contemporary landscape, the 21st century, education plays a pivotal role in equipping individuals with the tools to navigate a world marked by rapid, intense, and unpredictable changes. In this era, the ability to learn and adapt swiftly has become a cornerstone of success. Both educators and learners are called upon to cultivate not only subject-specific knowledge but also high-order learning skills, essential for thriving in the dynamic challenges of the modern age. Teachers, as facilitators of knowledge, bear the responsibility of not only imparting information but also honing their own learning skills. The evolving nature of the 21st century demands educators to be dynamic and adept at integrating contemporary teaching methodologies. A symbiotic relationship exists between the proficiency of teachers in acquiring new knowledge and their effectiveness in fulfilling their roles in this ever-changing educational landscape.

Educational institutions, as crucibles of knowledge, must align their curricula with the dual objectives of imparting core subjects and cultivating 21st-century skills. These skills encompass learning and innovation, life and career proficiency, and information, media, and technology literacy. Among these, learning and innovation skills stand out as linchpin competencies, given the perpetual evolution and increasing complexity of our global milieu. In a world where change is constant, individuals devoid of proficient learning and innovation skills find themselves struggling to keep pace with the ever-shifting paradigm. The absence of these critical skills not only hinders personal growth but also poses formidable challenges to navigating the complexities of contemporary life. Thus, education emerges as an imperative force, not merely confined to the transmission of knowledge but as a dynamic process that empowers individuals to confront and conquer the challenges of the 21st century. It is the cornerstone upon which a resilient, adaptable, and enlightened society is built, fostering a continuum of progress and well-being for all.

The methodology for developing learning experiences that authentically instill skills requires the seamless integration of collaborative learning, knowledge creation, and team-based learning. An educational management strategy that harmoniously aligns with these objectives is Creativity-based Learning (CBL). CBL is regarded as a noteworthy form of active learning extensively researched with Thai learners. The primary objective is to devise teaching methods that seamlessly integrate both subject content and essential 21st-century skills. Specifically, this approach naturally cultivates learners' proficiency in creative thinking. The implementation of CBL has yielded positive outcomes, fostering not only analytical but also creative thinking among learners, marking a significant departure from traditional teaching methods.

CBL is a foundational approach in the management of teaching and learning, where learners take a central role. The core structure of this creative learning and teaching method is designed based on the theory of measuring creative thinking by Professor E. Paul Torrance. The development approach of creative thinking, known as lateral thinking by Edward de Bono, has evolved from the Problem-based Learning (PBL). PBL emphasizes learner-centered teaching and has yielded positive results in various countries. The theory of creative thinking has led to the creation of a new model of active learning, where teaching is centered

around learners and utilizes the use of thinking tools in managing teaching and learning. Teaching through creative thinking involves prioritizing learners, similar to the use of representational thinking in instructional management. This process facilitates changing problem situations and enables the development of learning experiences through hands-on activities (Hall, 1996: 235). The use of representational thinking serves as a beneficial tool for learners in creating understanding, communicating information, and demonstrating reasoning (Greeno & Hall, 1997: 361-367). This enables learners to convey and link understanding about thinking processes, problem-solving method choices, and pathways for problem resolution. Communication may be facilitated through the use of graphs, tables, diagrams, maps, models, or symbols to convey the intended meaning.

To enhance the effectiveness of instruction, educators must possess a critical proficiency known as Technological Pedagogical Content Knowledge (TPCK). TPCK encompasses the understanding and skill of teachers to strategically and diversely incorporate technology into learning processes and instructional methods within their specific content domains. This knowledge empowers the creation of conducive learning environments, enabling students not only to absorb information but also to cultivate fresh insights in the subject matter through the adept use of appropriate technology. Educators proficient in managing these interrelationships can demonstrate this expertise in various ways, depending on their specific skills. The deliberate integration of technology across diverse subject matters has been shown to have a substantial impact, as elucidated by Mishra and Koehler in 2006.

This study seeks to outline guidelines for the creation of a novel instructional model, termed the TPCK-CBL Model, which integrates Creativity-Based Learning (CBL) with Technological Pedagogical Content Knowledge (TPCK). The focus is on applying this innovative model in the context of teaching Grade 7 mathematics.

The authors began by reviewing the literature related to CBL. Then, the authors summarized the common characteristics of CBL, resulting in six steps as shown in Table 1.

Source					Common characteristics of CBL
Riangnarong & Silanoi (2015)	Ruachaiphanich (2015)	Numna (2017)	Srisutham (2019)	Nureak (2021)	
Stimulate creative thinking	Stimulate interest	Stimulate interest	Stimulate interest	Stimulate interest	Stimulate students' interest to be creative
Set individual problems	Pose problems and group according to interests	Pose problems and group according to interests	Pose problems and group according to interests	Pose problems and group according to interests	Pose problems and group students based on common interests
Group activities	Research and think	Research and think	Research and think	Research and think	Collaboratively investigate and think
Present	Present	Present	Present	Present	Present results
Evaluate outcomes	Evaluate outcomes	Evaluate outcomes	Evaluate outcomes	Evaluate outcomes	Evaluate learning

Table 1: Summary of common characteristics of CBL

The foundation of creative learning management with the integration of technology consists of 6 steps.

Step 1: Stimulate Interest to Create
In this stage, the teacher explores the learners' prior knowledge. Then, they stimulate the learners' interest to generate creative thinking by presenting issues, problems, situations, or events encountered in daily life using diverse and contemporary media and technology.

Step 2: Identify the Creative Problem
In this stage, learners identify creative problems related to the presented issues, problems, situations, or events. The teacher, in the role of a coach, guides and advises learners in specifying problems within the scope of the presented issues or situations and the content of the lesson.

Step 3: Investigate to Construct Conceptual Representation and Create Product
In this stage, learners in each group collaborate to investigate and find answers from chosen learning sources related to their groups problem-solving. Subsequently, they collectively analyze the obtained answers and create a conceptual representation to summarize the knowledge. They then use technology appropriately. The teacher's role is to provide guidance, encourage learners to choose information accurately, monitor group work, offer suggestions, ask questions, and provide opportunities for learners to think independently.

Step 4: Present the Conceptual Representation and Product
In this stage, each group of learners presents the conceptual representation used to find answers to the set problem or the creative product of the group. This presentation is done using suitable media and technology. The teacher stimulates questions and comments to prompt learners to express thoughts on the subject and complements the knowledge.

Step 5: Apply
This stage involves the teacher encouraging learners to apply the knowledge gained from the search for answers. The teacher verifies the correctness to ensure learners develop accurate ideas and can apply them effectively.

Step 6: Summarize and Evaluate
In the final stage, learners collectively summarize all the knowledge acquired during the lesson. The teacher stimulates, checks, and supplements the parts where learners may have missed summarizing.

The authors then applied the 6 steps of the TPCK-CBL learning model to design the TPCK-CBL lesson plans for teaching the content of Graphs and Linear relations. The details of the lesson plan are as follows.

Step 1: Stimulate Interest to Create (Duration: 50 Minutes)

A teacher explores students' prior knowledge to ensure they have an adequate foundation for learning about pairs by having students take a pre-learning quiz on pairs, consisting of 10 questions. The quiz is conducted using the Kahoot application.

The teacher stimulates students' interest and encourages creative thinking by requiring them to watch the YouTube video titled "10 Tourist Attractions in Nakhonsithammarat: Travel Thailand." The video is 8.46 minutes long and can be accessed through the link https://www.youtube.com/watch?v=uwsWV2QlLPA.

After students have watched the video, the teacher randomly asks 4-5 students about the relationships they observed in various aspects from the video, using the following questions (10 minutes).

Teacher: From the video, what relationships did you observe?

Expected answer: relationships between various tourist attractions and their locations in Nakhonsithammarat province, such as the natural beauty of Kiriwong Village in Lansaka District, Nui Nok Nok Island in Khanom District, the sluice gate of Utakawipat and Lalum Phuk in Pakphanang District, the ancient city wall, Wat Mahathat Wora Maha Viharn, the main city shrine, Tha Nakasuksa Ratthawut Wichian Shrine, Nang Talung Suchart, and the halls of Phra Issawar and Phra Naryan in Mueang District.

Teacher: Which districts in Nakhonsithammarat have you visited, and what are they known for?

Expected answer: Student previous experiences, mentioning various districts in Nakhonsithammarat, such as Lansaka District with the best climate in Thailand, Mueang District with the Royal Park 84 (Thung Tha Lat), Pak Phanang District with the Klong Katun reservoir, Phrom Khiri Kiri District with the City Residency, and Sichon District with the Chedi Temple (Ai Khai), among others.

Teacher: What renowned local products or OTOP items do you know, have used, tasted from Nakhonsithammarat? Can you mention some products and specify which district they are from?

Expected answer: students' previous experiences, mentioning products like Lala sweets and Taptim Siam pomelos from Pak Phanang District, Taling Plao leather products from Mueang District, and natural dyed fabric and herbal products from Lansaka District.

The teacher commends the students for presenting their thoughts on the relationships observed in various aspects from the mentioned video. The teacher then provides an opportunity for students with additional questions or uncertainties regarding the video to ask further questions (5 minutes).

Step 2: Identify the Creative Problem (15 Minutes)

The teacher distributes Worksheet 1.1 on "The Relationships between Various Aspects and Locations in Nakhonsithammarat Province" (as attached in the learning plan). Each student individually specifies a creative problem found in the video clip "10 Tourist Attractions in Nakhonsithammarat: Travel Thailand." The teacher may provide an example of a problem for students to understand. Students can identify problems such as (15 minutes):

1. Is the coffee shop "Bus Cafe" located in the district of Sichon?
2. Is "Khanom La" from the Pak Phanang district the most famous in Nakhonsithammarat province?
3. Which districts in Nakhonsithammarat province are not coastal?
4. What are the renowned OTOP (One Tambon One Product) items in each district of Nakhon Si Thammarat, and in which district are they located?
5. Which seaside tourist destinations in Nakhonsithammarat province are popular among both local and international tourists, and in which district are they located?
6. What are the historical sites in Nakhonsithammarat province, and in which district are they located?
7. Does the Phrom Khiri District have the most waterfalls in Nakhonsithammarat province?

The teacher instructs all students to write down creative problems identified in the video following the guidelines provided in worksheet 1.1 on the relationships between various elements and the locations in Nakhon Si Thammarat. Each student records their problems on the classroom board. Afterward, the teacher and students collaborate to group the problems related to the relationships between the issues students wish to address and the locations in Nakhonsithammarat (20 minutes).

Students form groups of 4-6 members, grouping themselves based on the problems outlined in worksheet 1.1 regarding the relationships between various elements and the locations in Nakhon Si Thammarat. The number of groups depends on how many problem categories were summarized during the classroom presentations (10 minutes).

The teacher distributes Activity Sheet 1.1 regarding the guidelines for designing solutions to relationship-based problems between various elements and the locations in Nakhonsithammarat (as attached in the lesson plan). Each group of students is tasked with designing solutions for the relationship problems between their identified issues and the locations in Nakhon Si Thammarat. During this activity, the teacher acts as a coach, providing guidance on designing solutions that align with the identified problems related to various elements and the locations in Nakhonsithammarat (30 minutes).

Step 3: Investigate to Construct Conceptual Representation and Create Product (60 Minutes)

Each group of students collaborates to investigate and find answers to the problems assigned to them by studying information from various learning sources. They use the gathered information to construct conceptual representations and create products related to the assigned problems, utilizing suitable learning resources or databases. This may involve online research, library resources, textbooks, or Knowledge Sheet 1.1 on "Pairs" (as attached in the lesson plan). While students are engaged in research, the teacher observes their interests, curiosity, and questions, and provides suggestions and guidance to ensure that students effectively find solutions to the problems in a suitable and efficient manner (30 minutes).

Students use the information obtained from their research to complete Activity Sheet 1.2 on Creating Representations of Various Places in Nakhonsithammarat (as attached in the lesson plan). Group members work together to analyze the information or answers they have gathered and use them to create the most appropriate conceptual representation. This representation may take various forms such as tables, diagrams, maps, models, etc., aiming for a clear and concrete understanding of the solutions to the assigned problems. The teacher observes students' responsibility for their decision-making process, their efforts to ensure accuracy and precision, and their dedication to the task. Additionally, the teacher provides guidance on analyzing data or answers, ensuring correctness, and addressing any questions that arise during the data analysis and representation creation process (30 minutes).

Step 4: Present the Conceptual Representation and Product (60 Minutes)

The teacher randomly selects groups of students for presentation using a spinning wheel. The link shorturl. asia/KFLCI or the QR code is utilized for this purpose.

Representatives from each group present their conceptual representation or creative product using various media and technologies to explain their solutions to the assigned problems. Presentations follow the sequence determined by the randomly selected order. Each group is given a presentation time not exceeding 5 minutes. After each group completes their presentation, the teacher encourages the audience to ask questions, share thoughts, and analyze the accuracy and coverage of the solutions presented by their peers. The teacher provides guidance, stimulates questions, shares comments, and analyzes answers or conceptual representations and creative products from other classmates (30 minutes).

Each group of students verifies the accuracy of their answers to ensure comprehensive coverage. They also make improvements and corrections based on questions, comments, and suggestions from peers and the teacher. Throughout this process, the teacher may ask questions to guide students in refining their answers and ensuring they address the problems comprehensively.

Question: Is tie-dye fabric an OTOP product of only Lankasuka District, or is it available in other districts in Nakhonsithammarat Province?

Expected answer: Tie-dye fabric is an OTOP product in Lankasuka District, Chawang, and Nopphitam in Nakhonsithammarat Province. However, tie-dye fabric from Lankasuka District is the most renowned OTOP product.

The teacher comments the students' works focusing on researching solutions, creating conceptual representations, and presenting their works excellently. Subsequently, each group of students is to submit Activity Sheet 1.1 and Activity Sheet 1.2 to the teacher (15 minutes). The teacher and students collectively discuss and summarize the knowledge gained from the research, which should be summarized as follows (5 minutes).

Guidelines for summarizing knowledge gained from research:

The problem and the answers obtained revolve around the relationship of pairing between two things. In mathematical terms, the relationship of pairing between members of two groups is referred to as an "ordered pair."

The teacher presents additional knowledge about "Ordered pairs" as follows (takes 5 minutes).

If 'a' is a member of the first group and 'b' is a member of the second group, expressed in symbols as (a, b), it is read as "ordered pair A, B." 'a' is referred to as the first element, and 'b' is referred to as the second element.

The teacher presents an additional example regarding "Ordered pairs" as follows:

Example: Write all the ordered pairs from the table showing the relationship between the number of days and the number of hours that your teacher dedicates to teaching at school. Let the first member represent the number of days, and the second member represents the number of hours your teacher dedicates to teaching.

Number of days	1	2	3	4	5	6
Number of hours	6	12	18	24	30	36

Expected answer: You can write all the ordered pairs with the first member as the number of days and the second member as the number of hours as follows: (1, 6), (2, 12), (3, 18), (4, 24), (5, 30), (6, 36).

The teacher presents an additional example regarding "Ordered pairs" as follows:

Example: Write all the ordered pairs from the table showing the relationship between the number of days and the number of hours that your teacher dedicates to teaching at school. Let the first member represent the number of days, and the second member represent the number of hours your teacher dedicates to teaching.

The teacher gives students the opportunity to ask additional questions or express doubts about ordered pairs and examples of ordered pairs (5 minutes).

Step 5: Apply (35 minutes)

The teacher encourages students to apply the knowledge gained from the search for answers by randomly assigning students to write ordered pairs of solutions to problems with the locations in Nakhon Si Thammarat. Students should read and explain the meaning of each ordered pair (5 minutes).

The teacher asks questions for students to compete in answering, aiming to check their understanding and create enthusiasm. The first student to answer correctly will receive a reward from the teacher (5 minutes).

Question: Create three different and diverse ordered pairs. The first member can be any number, and the second member is one of three times that number.

Expected answer: The answer can vary, such as three different and diverse ordered pairs. The first member can be any number, and the second member is one of three times that number, for example $(3,1), \left(-\frac{1}{2}, -\frac{1}{6}\right), (1.23, 0.41)$ etc.

Teacher Instructions: The teacher instructs the students to complete the skills exercise 1.1 on ordered pairs (as provided in the attached document) to assess their understanding. The teacher emphasizes applying the knowledge gained from the activity (20 minutes).

After completing Skills Exercise 1.1 on Ordered Pairs (as attached in the learning plan document), the teacher randomly selects individual students to present their solutions. Each student is required to honestly record their scores in the score sheet. The teacher then collects the exercises for further evaluation. If any student scores below the specified standard, the teacher schedules remedial sessions for those students after school or assigns simpler exercises to reinforce their foundational knowledge (5 minutes).

Step 6: Summarize and Evaluate (25 Minutes)

In collaboration, students summarize the knowledge gained from the lesson on "Ordered Pairs" as follows (5 minutes).

Guidelines for summarizing the knowledge gained from the lesson on "Ordered Pairs."

"Ordered Pairs" refer to the relationship of pairing elements between two groups.

If 'a' is a member of the first group and 'b' is a member of the second group, it is represented by the symbol (a, b). Read as 'Ordered Pair AB,' where 'a' is referred to as the first member, and 'b' is referred to as the second member.

The teacher prompts, checks, and fills in gaps in the parts where students may have incomplete summaries. The teacher raises questions related to "Ordered Pairs" by randomly selecting students to answer. Students are asked to match the ordered pairs of the problem's answers with the locations in Nakhonsithammarat that they researched and write them in the form of ordered pairs (a, b) and (b, a). The teacher then discusses the meaning of these ordered pairs (5 minutes).

Question: Do (a, b) and (b, a) have the same meaning? Explain.

Expected answer: (a, b) and (b, a) do not have the same meaning. For example, (Namtok Phrom Lok, Amphoe Phrom Khiri) means Namtok Phrom Lok is located in Amphoe Phrom Khiri. On the other hand, (Amphoe Phrom Khiri, Namtok Phrom Lok) means Amphoe Phrom Khiri is within Namtok Phrom Lok. Therefore, (Namtok Phrom Lok, Amphoe Phrom Khiri) and (Amphoe Phrom Khiri, Namtok Phrom Lok) have different meanings.

Teachers evaluate learning outcomes by having students complete a post-test on the topic of matching pairs, consisting of 10 questions (10 minutes).

Teachers assess students' learning outcomes through the evaluation of Assignment 1.1 on the topic of the relationships between various elements and the locations in Nakhonsithammarat province. This includes Activity Sheet 1.1 on designing relational problem-solving approaches between different elements and their locations in Nakhonsithammarat province, as well as Activity Sheet 1.2 on creating representations of various ideas in different locations within the province, using appropriate assessment criteria (5 minutes).

Conclusion: Implications

This article showcases the integration of technology into Creativity-Based Learning (CBL) to formulate the TPCK-CBL model, aiming to augment students' creative thinking and conceptual representation. The authors implement six teaching steps within the TPCK-CBL model while crafting lesson plans tailored for teaching mathematics to Grade 7 students. Demonstrated as beneficial for both educators and learners, the TPCK-CBL model strives to nurture students' analytical and creative thinking alongside fostering knowledge creation.

Facilitating the communication of understanding, the model incorporates the use of graphs, tables, diagrams, maps, models, or symbols. Moreover, active student participation in the learning process promotes effective teamwork and collaboration. These attributes are paramount in the 21st century, and fostering such qualities among the children and youth of Thailand holds the promise of cultivating a high-quality population, ensuring the nation's sustainable future.

Acknowledgments

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Integration of STEAM With Local Context for Enhancing Early Childhood Students' Creativity

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Abstract

This article aims to: a) review, analyze and synthesize the literature related to Science, Technology, Engineering, Art and Mathematics (STEAM) education and Context-based Learning (CBL); and b) developing the Context-based STEAM instructional model for enhancing creative skills in early childhood. The authors analyzed the STEAM instruction from the national and international contexts by using content analysis. Then, the researchers synthesized the teaching steps of STEAM Integrated with Local Context (L-STEAM) for enhancing early childhood students' creative thinking. The teaching steps from these literatures were analyzed. From the analysis, the authors synthesized the L-STEAM teaching model consisted of six teaching steps: a) Introduce STEAM problem, b) Investigate, c) Act, d) Share, e) Apply and Extend and f) Self-assessment. At final, the authors raised one example of L-STEAM lesson plan for teaching the Toys and Accessories topic for early childhood students. This example may guide other early childhood teachers in applying local context in teaching with STEAM in any subject they assigned to teach.

Keywords: STEAM Education, Local Context, Creative Thinking, Early Childhood

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Introduction

Thailand places importance on delivering education with quality and equity for all Thai citizens. As evident in the 2017 Constitution of the Kingdom of Thailand, Section 5 Article 54, "The state shall ensure that every child receives twelve years of education, from pre-school to the end of compulsory education, with quality and without charge" (Office of the Secretary-General of the House of Representatives, 2540, p. 14). Additionally, the 1999 National Education Act, as amended in 2002 (2nd edition), Article 10: Rights and Responsibilities in Education, specifies that "Education management must provide individuals with equal rights and opportunities for basic education without charge, not less than 12 years" (Office of the National Education Commission, 2545, p. 7).

Quality education is crucial for the development of the country, as emphasized in the National education plan B.E. 2560-2579 (A.D. 2017-2036) (Office of the Education Council, 2017):

> Education is a fundamental right of all Thai citizens that the state must provide to foster the holistic development of individuals at every stage of life. It aims to cultivate intellectual capital crucial for developing skills, qualities, and competencies necessary for professions and leading a fulfilling life in harmony with others in society. (p. 10)

In the Early Childhood Curriculum B.E. 2560 (A.D. 2017), early childhood education concentrates primarily on fostering the holistic development of children from birth to the age of six. The overarching goal of early childhood education is to provide a comprehensive and nurturing learning environment that supports the physical, emotional, social, and cognitive growth of young learners (Ministry of Education Thailand, 2017). Early childhood education encompasses the deliberate cultivation of caregiving skills and the facilitation of learning processes that seamlessly correspond with the natural and age-appropriate development of every child. This approach is designed to unlock each child's fullest potential within the unique framework of their social and cultural environment.

Early childhood education plays a pivotal role in shaping children into well-rounded adults, particularly in the context of the substantial societal and economic shifts witnessed in the 21st century. With rapid advancements in science and technology defining this era, fostering early learning in science, technology, and mathematics becomes imperative. By emphasizing these foundational skills during the formative years, we equip children with the essential tools needed for both current learning and future life challenges. This approach empowers them to lead a high-quality life that aligns seamlessly with the dynamics of both the contemporary world and upcoming transformations (Ministry of Education Thailand, 2017).

Early childhood is crucial for the development of cognitive abilities and the nurturing of creativity. Introducing STEAM concepts during this period sets a solid foundation for a lifelong love of learning and exploration. Hands-on, experiential activities delivered through STEAM education can engage children minds, making learning a joyful and memorable experience. STEAM education embodies an integrated teaching approach that seamlessly combines Science, Technology, Engineering, Arts, and Mathematics into a cohesive and unified pedagogical framework. STEAM education goes beyond the conventional boundaries of subjects, encouraging a holistic approach to learning. By seamlessly integrating science, technology, engineering, arts, and mathematics, educators aim to cultivate a multidimensional

skill set that empowers students to solve complex problems, think creatively, and adapt to an ever-changing global landscape (Loapideht, 2013; Ministry of Education, Thailand, 2017).

Context-based Learning (CBL) is recognized as a constructivist teaching method that places strong emphasis on and leverages the local context surrounding children throughout the learning process. Integrating local context with STEAM education elevates the significance of cultural and contextual relevance in early childhood learning, adding an extra layer of importance to the educational process. By infusing lessons with elements from students' cultural backgrounds, educators not only boost engagement but also nurture a sense of identity and pride. This approach acknowledges the diversity among learners, ensuring that education remains relatable and meaningful for each student (Crawford, 2001; Bennett, Grasel, Parchmann and Waddington, 2005; Gilbert, 2006; Potter and Overton, 2006; Boonmaton, Supap and Wiriyapong, 2018; Tungkawasakul 2017; Tippang, 2019; Gudhom, 2017).

Integrating the local context can significantly enhance student engagement in learning. Students are more likely to be engaged and motivated when learning experiences resonate with their daily lives and cultural backgrounds. The fusion of STEAM with the local context not only encourages students to think creatively but also facilitates the connection of theoretical concepts with real-world applications within their own cultural framework. However, upon a thorough examination of the literature pertaining to education in the Thai context, it becomes evident that there is a gap in research regarding the current situation, problems, and needs regarding the integration of local context in STEAM education for teaching early childhood.

Research Questions

The research questions were: a) What are the current situation, problems, and needs related to STEAM education and CBL in the context of early childhood education; and b) What are the desirable characteristics of a new learning model integrated STEAM education and CBL.

Research Objectives

The research objectives were two folds: a) to investigate the current situation, problems, and needs of STEAM education and CBL in early childhood education; and b) to develop a new learning model integrated STEAM education and CBL for early childhood education.

Literature Review

This section presents the literature review about CBL and STEAM education as follows.

Context-Based Learning (CBL)

The transformations in the learning landscape of the 21st century have given rise to teaching approaches that underscore the significance of context, notably termed as Context-based Learning (CBL). Within CBL, learners engage in educational experiences intertwined with real-life situations encountered in their daily lives. The integration of context in teaching proves advantageous in cultivating students' skills and fostering a profound comprehension of knowledge. CBL serves as a pedagogical strategy that prioritizes delivering learning content within a context closely tied to students' everyday realities. This principle is dedicated to

advancing learning experiences that resonate with various situations in learners' daily lives, facilitating the connection of acquired knowledge with real-life experiences.

CBL underscores the importance of integrating contexts aligned with real-life situations, fostering engaging and meaningful learning experiences for students. The successful implementation of CBL in educational settings necessitates support from educational organizations and teachers alike. Schools should actively create an environment conducive to the incorporation of context in teaching, while teachers should undergo training to enhance their skills in crafting and delivering contextually rich lessons.

Hence, CBL emerges as a teaching strategy that accentuates the creation of meaningful learning experiences closely aligned with real-life situations in learners' day-to-day existence. By employing context as the foundation for learning, this approach involves linking the learning content to the experiences and situations in the actual lives of students. This connection ensures that the learning is not only meaningful within its immediate context but also applicable and transferable to diverse situations, enriching the overall educational experience (Crawford, 2001; Bennett, 2005; Gilbert, 2006; Potter and Overton, 2006; Boonmatan, 2016; Tungkawasakul 2017; Tippang, 2019; Kuadhom, 2017).

STEAM Education

STEAM Education, an innovative educational approach seamlessly integrating Science, Technology, Engineering, Arts, and Mathematics into the learning process. Martinez and Stager (2013) underscored the significance of providing students with opportunities to creatively produce their own work through engaging science and engineering activities through STEAM education. Mae Jemison (2019), a renowned astronaut and physician, advocates for the fusion of science and art, actively supporting STEAM Education as a means to cultivate creativity in students. Mitch Resnick (2018), is an executive and researcher, who leads the Scratch project, which is a creative programming learning platform used to promote collaboration with technology in creative production. Andrea Beaty (2013) is the author of the book "Rosie Revere, Engineer" and other works that focus on encouraging children's interest in experimentation and creative work in various STEAM fields. The scholars emphasize the importance of STEAM Education in developing essential skills for the future e.g., fostering creativity, and collaborating with technology and innovation in a rapidly changing society (Martinez and Stager, 2013; Beaty, 2013).

Research Methodology

This research employs a mixed-method research design. Specifically, the quantitative research utilizes survey research, while the qualitative research involves Focus Group Discussions (FGD).

Quantitative Research

The quantitative research was a survey of teachers' and parents' perspectives on the current situation, problems and needs regarding STEAM education and CBL.

Data Collection

The research instrument was a questionnaire incorporating a five-scale rating (5 = Very high, 4 = High, 3 = Moderate, 2 = Low, and 1 = Very low). For collecting data from teachers, the researchers utilized an instrument called "Problems and Needs in Teaching with STEAM and CBL Questionnaire," which was structured into three distinct parts: Part 1: Background of respondents (5 items); Part 2: Problems and needs in in teaching with STEAM and CBL (20 items); and Part 3: Suggestions for further developing STEAM and CBL (1 open-ended item).

For collecting data from parents, the researchers utilized an instrument called "Problems and Needs in Teaching with STEAM and CBL Questionnaire," which was structured into three parts: Part 1 background information. Part 2 problems and needs of teaching with STEAM and CBL (16 items) and Part 3 suggestions.

Data Analysis

The background data from Part 1 was analyzed for frequencies and percentages. The data from Part 2 was analyzed by calculating for mean and standard deviation (SD). The interpretation of mean ranges of each item in Part 2 (Wongratana, 2007) was as: mean 4.50 - 5.00 was interpreted as a Very High level of problems and needs; while mean 3.50 - 4.49, 2.50 – 3.49, 1.50 – 2.49, and 1.00 – 1.49 were interpreted as the problems and needs were at a High, Moderate, Low and Very Low levelsm respectively. Furthermore, the qualitative data from Part 3 was analyzed by content analysis.

Qualitative Research

Focus group discussion (FGD) were conducted with 35 early childhood teachers (all females), who had experience in teaching with STEAM education and CBL more than five years.

Data Collection

The FGD with teachers about current situation, problems, and needs in STEAM education and CBL was a semi-structured interview: three, one and three questions focusing on the current situation, problems and needs of STEAM education and CBL, respectively.

Data Analysis

The researchers using five steps in analyzing qualitative data from FGDs Preparing, Segmenting, Coding, Categorizing and Thematizing (Buaraphan, 2017).

Results and Discussion

The results and discussion will be presented according to the research questions as follows.

Teachers' Perspectives on Current Situation, Problems and Needs in Teaching With STEAM Education and CBL

All responding teachers were female. Most of them aged 41-45 years old (34.30%), followed by 46-50 years old (31.40%), and 51-55 years old (11.40%). A majority of respondents was fallen in a Professional Level (K2) (68.60%), followed by Practitioner Level (K1) (14.30%) and Others (14.30%). A majority of respondents have teaching experience ranging from 21 to 25 years (37.10%), followed by 16 to 20 years (20.00%) and less than 6 years (14.30%).

Of 35 respondents, the teachers' perspectives on the problems and needs in implementing STEAM education and CBL can be presented as Table 1.

Statement		Mean	SD	Interpretation
Problems				
	School			
1.	STEAM education is not suitable for the local community context.	3.17	1.12	Moderate
2.	STEAM education is not suitable for the school context.	3.14	1.12	Moderate
3.	School administrator does not support STEAM education.	3.26	1.07	Moderate
4.	Teachers do not support STEAM education.	3.09	1.17	Moderate
	Curriculum			
1.	School lacks a STEAM education curriculum.	3.31	1.03	Moderate
2.	School lacks the STEAM education lesson plans.	3.43	1.04	Moderate
3.	Implementation of STEAM education is not widespread in the school.	3.51	0.98	High
	Teacher			
1.	Teachers are not yet ready for STEAM education.	3.43	0.98	Moderate
2.	Teachers lack knowledge and understanding of STEAM education.	3.03	0.89	Moderate
3.	Teachers lack awareness of the importance of STEAM education.	3.26	1.01	Moderate
4.	Teachers lack skills in teaching with STEAM education.	3.14	0.97	Moderate
5.	Teachers have not sufficiently utilized local contexts in teaching with STEAM education.	3.29	1.07	Moderate
	Student			
1.	Kindergarten students are not yet ready for STEAM education.	3.34	1.11	Moderate
2.	Kindergarten students are not yet ready in learning with context-based learning.	2.94	0.94	Moderate
3.	Students have not yet developed problem-solving skills to a satisfactory level.	3.09	1.01	Moderate
4.	Students have not yet developed creative thinking skills to a satisfactory level.	3.23	0.94	Moderate

5.	Students have not yet developed sufficient awareness of local context conservation.	3.26	0.78	Moderate
	Overall problems	**3.23**	**1.02**	**Moderate**
Needs				
	School			
1.	The local community needs STEAM education.	3.23	0.84	Moderate
2.	Schools need STEAM education.	3.83	0.89	High
3.	School administrators should support the implementation of STEAM education.	3.86	0.88	High
4.	School administrators should support the use of local context into teachers' teaching.	3.91	0.92	High
	Curriculum			
1.	Schools should develop a STEAM education-based curriculum.	4.03	0.89	High
2.	Schools should promote teachers to design STEAM education-based lesson plans.	3.83	0.71	High
3.	Schools should encourage the implementation of STEAM education across all levels within schools.	3.94	0.64	High
	Teacher			
1.	Teachers should be ready prepared for implementation of STEAM education.	3.94	0.68	High
2.	Teachers should improve their knowledge and understanding of STEAM education.	4.17	0.75	High
3.	Teachers should raise their awareness of the importance of STEAM education.	4.26	0.78	High
4.	Teachers should develop skills in teaching with STEAM education.	4.23	0.77	High
5.	Teachers should utilize local contexts in teaching STEAM education.	4.23	0.81	High
	Students			
1.	Kindergarten students should be ready prepared for learning with STEAM education.	4.31	0.76	High
2.	Kindergarten students should be ready for context-based learning.	3.97	0.75	High
3.	Students should be developed problem-solving skills to a satisfactory level.	3.89	0.76	High
4.	Students should be developed creative thinking skills to a satisfactory level.	3.94	0.80	High
5.	Students should be developed awareness of local context conservation.	4.06	0.80	High
	Overall needs	**3.98**	**0.79**	**High**

Table 1: Teachers' perspectives on the problems and needs in implementing STEAM education and CBL

In overall, the responding teachers perceived a moderate level (mean = 3.2, SD = 1.02) of problems in implementation of STEAM education and CBL. The top three problems were:

Implementation of STEAM education is not widespread in the school (mean = 3.51, SD = 0.98), followed by the school lacks the STEAM education lesson plans (mean = 3.43, SD = 1.04) and Teachers are not yet ready for STEAM education (mean = 3.43, SD = 0.98).

The responding teachers reflected a high level (Mena = 3.98, SD = 0.79) of needs in teaching with STEAM education and CBL. The top three needs were: Kindergarten students should be ready prepared for learning with STEAM education (mean = 4.31, SD = 0.76), followed by Teachers should raise their awareness of the importance of STEAM education (mean = 4.26, SD = 0.78), Teachers should develop skills in teaching with STEAM education (mean = 4.23, SD = 0.77), and Teachers should utilize local contexts in teaching STEAM education (mean = 4.23, SD = 0.81).

Parents' Perspectives on Current Situation, Problems and Needs in Teaching With STEAM Education and CBL

From the survey of 21 parents regarding the current situation, problems and need in learning with STEAM education and CBL, a majority of respondents were female (66.70%) with their age range between 56 to 60 years old (81.00%).

Statement		Mean	SD	Interpretation
Problems				
1.	School are not ready yet for implementing STEAM education.	1.81	0.93	Low
2.	Teachers are not yet ready for STEAM education.	1.62	0.74	Low
3.	Teachers lack skills in teaching with STEAM education.	2.05	0.92	Low
4.	Teachers have not sufficiently utilized local contexts in teaching with STEAM education.	2.14	0.72	Low
5.	Kindergarten students are not yet ready for STEAM education.	1.86	0.65	Low
6.	Students have not yet developed problem-solving skills to a satisfactory level.	1.67	0.73	Low
7.	Students have not yet developed creative thinking skills to a satisfactory level.	1.48	0.75	Low
8.	Students have not yet developed sufficient awareness of local context conservation.	1.86	0.65	Low
	Overall problems	**1.81**	**0.76**	**Low**
Needs				
1.	The school needs to be developed to be ready to implement STEAM education.	2.81	1.12	Moderate
2.	Teachers should be ready prepared for implementation of STEAM education.	3.43	0.98	Moderate
3.	Teachers should raise their awareness of the importance of STEAM education.	3.48	0.51	Moderate
4.	Teachers should utilize more local contexts when teaching with STEAM education.	3.90	1.04	High

5.	Kindergarten students should be ready prepared for learning with STEAM education.	3.81	0.75	High
6.	Students should be developed problem-solving skills to a satisfactory level.	4.00	0.84	High
7.	Students should be developed creative thinking skills to a satisfactory level.	4.38	0.81	High
8.	Students should be developed awareness of local context conservation.	4.28	0.78	High
	Overall needs	**3.76**	**0.85**	**High**

Table 2: Parents' perspectives on the problems, and needs in implementing STEAM education and CBL

In overall, the responding parents perceived a low level (mean = 1.81, SD = 0.76) of problems in teaching with STEAM education and CBL. Three top problems were: Teachers have not sufficiently utilized local contexts in teaching with STEAM education (mean = 2.14, SD = 0.72), followed by Teachers lack skills in teaching with STEAM education (mean = 2.05, SD = 0.92), and Students have not yet developed sufficient awareness of local context conservation (mean = 1.81, SD = 0.86).

In addition, the parents reflected a high level of needs in STEAM education and CBL (mean = 3.76, SD = 0.85). The top three needs were: Students should be developed their creative thinking skills to a satisfactory level (mean = 4.38, SD = 0.81), followed by Students should be developed their awareness of local context conservation (mean = 4.28, SD = 0.78), and Students should be developed their problem-solving skills to a satisfactory level (mean = 4.00, SD = 0.84).

From FGD, the participating teachers reflected their perspectives on the current situation in teaching with STEAM education and CBL in three main points.

Current situation 1: Teachers were not yet ready prepared for integrating local contexts with STEAM education

The teachers stated that though they implemented STEAM with their students, they still lacked an ability to apply local contexts in STEAM teaching. They reflected the issues like: Integrating local contexts with STEAM education was a novel idea; They tried to emphasize integration of STEAM in various contexts; they tried to integrate STEAM disciplines; STEAM education provided students with the opportunity for developing problem-solving skills.

> In STEAM education, children were tasked with collecting leaves to craft into boats. Before embarking on the actual creation, the children were encouraged to plan and draw pictures, and then they floated their boats to observe whether they sank or floated. The children were joyful, and there was significant collaboration in organizing the activity. (Teacher 01*, FGD)
> *Note: T01 representing Teacher no. 1 in FGD

Current situation 2: Teachers reflected positive attitudes towards STEAM education

The participating teachers reflected their positive attitudes towards STEAM education as: STEAM education was a new pedagogy for kindergarten level; Students learned with STEAM could apply knowledge in real situations and develop creativity; Students enjoy STEAM education through practice and design; STEAM education could facilitate the holistic development in children. However, teachers mentioned obstacles like: Teaching with STEAM education took too much time and Some children need more encouragement to work collaboratively in team.

Current situation 3: Appropriateness in integrating local contexts with STEAM education

The participating teachers stated that integrating various local contexts with STEAM education was suitable for kindergarten students and school contexts. In addition, the teachers mentioned their problems in teaching with STEAM education. The teachers stated the difficulty in managing student learning in STEAM education. Many parents and children did not understand the multiple steps of STEAM education.

The participating teachers agreed that teaching with STEAM education was an innovative idea and they stated their needs in teaching with STEAM education: more learning resources, more support from schools, more trainings on knowledge and skills being essential for successful implementation of STEAM education in kindergarten level. In overall, STEAM education could promote continuous development in children.

Development of a New Learning Model Integrated Local Contexts in STEAM Education for Teaching Early Childhood Education

The authors reviewed the literature related to STEAM education and CBL (CORD, 1999; Bennett, 2005; Gilbert, 2006; De Jong and den Hartog, 2008; University of Southern California, 2009; Thanakwong, 2016; Sa-nguansak, 2019; Plodpluang, 2020) Subsequently, they synthesized the steps of Local Context-based STEAM Education (L-STEAM) into six steps, as outlined in Table 3.

Key Characteristics of CBL	Key Characteristics of STEAM Education	Summary of key characteristics of Context-based STEAM Education
Learning emphasizing contexts being relevant to learners' diverse real-life experiences	Learning is organized in an integrative manner of STEAM	Engaging learners by introducing a STEAM problem integrated diverse and appropriate local contexts being relevant to students' real-life experiences
	A teacher presents problem situations that exist in the real-life context of the learners	A teacher presents problem situations that exist in students' real-life contexts.
	Students gather information and ideas related to the problem	Students gather information and ideas related to the problem
	Students choose an appropriate problem-solving method and create art-embedded product	Students choose an appropriate problem-solving method and create art-embedded product

Learning through hands-on and problem-solving activities	Students test and evaluate the created product and seek ways to improve it	Students work collaboratively to test and evaluate the created product and seek ways to improve it
Learning collaboratively		
Presentation of learned knowledge	Students present products and process and get feedbacks from a teacher and peers	Students present products and process and receive feedbacks from a teacher and peers for further improvement
Applying learned knowledge meaningfully to other contexts		Students apply and transfer learned knowledge and experience meaningfully to other contexts
Transferring learned knowledge to different situations		
Self-assessment of learning	Students gain positive attitudes towards learning process and outcome	Students conduct self-assessment and cultivate positive attitudes towards learning with STEAM education

Table 3: Summary of key characteristics of Context-based STEAM Education

STEAM stands for Science (S), Technology (T), Engineering (E), Arts (A), and Mathematics (M). STEAM education is rooted in STEM education emphasizing learner-centered pedagogy that begins with problem-solving in the context of students' real lives.

The teaching steps of components Context-based STEAM Education can be described as: **Step 1: Introduce STEAM problem:** The teacher presents real-life problem situations in the context of students' lives, connecting Science (S), Technology (T), Engineering (E), Arts (A), and Mathematics (M); **Step 2: Investigate:** Students gather information about the problem, choose problem-solving methods, and design integrated artistic works: **Step 3: Act** Students collaboratively engage in hands-on testing and evaluate their works; **Step 4: Presentation:** Students present their problem-solving methods and integrated artistic works; **Step 5: Apply and Extend:** Application and extension of knowledge, where students apply what they have learned to different situations; and **Step 6: Self-assessment:** Students assess their own learning, review their work, and identify areas for improvement after each session.

Conclusion

The teachers in this study reflected a moderate level of problems in implementing STEAM education and CBL in kindergarten level. They also mention that the school lacks STEAM education lesson plans and kindergarten teachers are not yet ready for STEAM education. The teachers reflected a high level of needs in teaching with STEAM education and CBL. The teachers state that the kindergarten students should be ready prepared for learning with STEAM education. In addition, kindergarten teachers should raise an awareness of STEAM education and further develop skills in integrating local contexts with STEAM education.

The parents in this study perceived a low level of problems in teaching with STEAM education and CBL. They mention that teachers lack STEAM teaching skills and have not sufficiently utilized local contexts in teaching. Students have not yet developed sufficient awareness of local context conservation. Also, the parents reflected a high level of needs in teaching with STEAM education and CBL. They need their child to further develop problem-solving skills, creative thinking skills and awareness of local context conservation.

Early childhood teadhers can effectively utilize the L-STEAM model outlined in this study. Additionally, they have the option to employ the guidelines provided in this research to craft a new learning model tailored to their specific classroom and school settings. Successful integration of the L-STEAM model hinges on increased support from both school administrators and local communities. Administrators play a pivotal role in fostering an environment conducive to the implementation of the L-STEAM model, urging educators to adopt it and facilitating the exchange of insights acquired from real-world applications in kindergarten classrooms through Professional Learning Communities (PLCs). To further enhance the competence of teachers interested in implementing the L-STEAM model, comprehensive training is essential, encompassing a deep understanding, enhanced abilities, and heightened awareness of the model's effective implementation.

Acknowledgment

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Ustaz Hanafi: A Transformative Figure in Malay Silat Through the Education of the Persatuan Seni Silat Cekak Malaysia (PSSCM)

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Abstract

Ustaz Hanafi, the late Founder, President, and Guru Utama of the Persatuan Seni Silat Cekak Malaysia (PSSCM), was a well-known figure among the members of the organization and the Malay martial arts community. This study aims to examine Ustaz Hanafi's character as a Silat master in PSSCM. Interviews were conducted with 15 active members who had studied under Ustaz Hanafi during the early days of PSSCM. The findings revealed that Ustaz Hanafi possessed a firm and serious demeanour as a Silat master, which was crucial for effectively transmitting and preserving the knowledge of the martial art. Despite the organization being in its infancy in Kuala Lumpur, Ustaz Hanafi's compassionate nature as a teacher fostered a strong bond with his students, ensuring their continued dedication and participation in PSSCM. The philosophy of Ustaz Hanafi's Silat education aimed to cultivate individuals who would contribute to their religion, nation, and country. His distinctive character set him apart from other contemporary Silat masters and allowed him to transform many troubled individuals within PSSCM into better versions of themselves. This paper explores in detail how Ustaz Hanafi's character contributed to the growth and development of PSSCM as a prominent martial arts organization. His leadership, combined with his strict yet caring approach, propelled the organization forward and established its reputation as it stands today. Ustaz Hanafi's legacy as a Silat master continues to inspire and shape the values of PSSCM, fostering a community of dedicated practitioners who strive to make a positive impact.

Keywords: Malay Silat, Martial Art, Transformative Figure, Education

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Introduction

Ustaz Hanafi is a transformative figure in the world of Malay Silat, particularly through his role as the founder and 1st Guru of the Persatuan Seni Silat Cekak Malaysia (PSSCM). His influence extends beyond just the physical aspects of Silat, as he emphasized the importance of upholding moral values and respecting one's cultural heritage. Ustaz Hanafi sought to instil a sense of national pride and a strong moral compass in the youth practicing Silat through education within the PSSCM. His teachings encompassed not only the physical discipline of martial arts but also emphasized the significance of moral education and the preservation of cultural traditions. Ustaz Hanafi's dedication to nurturing individuals into well-rounded citizens echoes a sentiment shared by other educators, conveying a holistic approach to personal and national development. According to (Jayanti & Kumalasari, 2022), culture, education, and religion are interrelated. Ustaz Hanafi recognized the importance of integrating religion, culture, and patriotism in shaping the character of individuals and promoting unity within society.

Historically, Silat Cekak was reborn in 1965 with the involvement of 20 students, including Ustaz Hanafi. It was initially introduced as a Silat organization in 1964 under the name Perkumpolan Seni Sari Budaya Sri Kedah and later as Persatuan Seni Silat Chekak Kedah Malaysia in 1971. Subsequently, Ustaz Hanafi strengthened Seni Silat Cekak Malaysia by establishing the legally recognized association PSSCM in 1975 under the Registrar of Societies in Malaysia. Ustaz Hanafi founded PSSCM with the aim of extending the teaching of Seni Silat Cekak Malaysia to communities across Peninsular Malaysia, with a particular focus on students in higher education institutions. This expansion is evident in the initiation of classes in Universiti Malaya (UM), Universiti Kebangsaan Malaysia (UKM), Institut Teknologi MARA (ITM), Universiti Sains Malaysia (USM) and Universiti Pertanian Malaysia (UPM) from 1974 to 1976 (Ahmad & Janudin, 2023). Presently, the number of classes continues to grow in higher education institutions, extending to include education institutions at the middle and elementary school levels. Through the years, his philosophy in teaching students is still relevant and aligns with the national education philosophy. Ustaz Hanafi's approach aligns with Malaysia's national education philosophy, emphasizing holistic development to create well-balanced individuals with intellectual, spiritual, emotional, and physical harmony. The philosophy aims to produce knowledgeable, competent citizens with high moral standards, fostering personal well-being and contributing to family, society, and the nation at large (Malaysia, 2013).

Researchers have undertaken numerous studies to explore the cultivation of positive values contributing to the development of commendable character traits within PSSCM members. One of the earliest studies was conducted by (Ismail, 2002) that discussed the role of Seni Silat Cekak Malaysia in cultivating the self-identity of its members. He asserted that PSSCM, as a non-governmental organization active in safeguarding positive native culture, plays a crucial role in addressing the fading identity of the Malay nation. As a curriculum subject in higher education institutions, Seni Silat Cekak Malaysia has effectively honed the soft skills of university students through their involvement in diverse events that extend beyond the exclusive focus on martial arts (Aizat & Nurazreena, 2013; Maoinser, M. Zaid, & W. Mohar, 2017). The spectrum of soft skills developed by PSSCM includes communication skills, critical thinking and problem-solving skills, teamwork skills, continuous learning and information management, entrepreneurial skills, professional ethics and morality, and leadership skills. In addition to these skills, Seni Silat Cekak Malaysia is proficient at nurturing the Islamic spiritual aspect of its Muslim members, aligning its practices with

Islamic teachings and Malay culture (Ahmad, Ab Majid, Aziz, & Ahmad, 2019; Ezani & Salleh, 2021). Furthermore, PSSCM fosters a sense of volunteerism among its members, contributing to community development and empowerment in Malaysia (Janudin & Samah, 2020).

Despite the existing studies, there is a noticeable gap in research focusing on the character of Ustaz Hanafi and its impact on fostering positive values among PSSCM members. Hence, this manuscript seeks to undertake a qualitative investigation into the characters of Ustaz Hanafi. Through interviews with a cohort of 15 individuals who shared a close relationship with Ustaz Hanafi between 1975 and 1986, this study aims to uncover the fundamental aspects of his character as Guru Silat Cekak. The ultimate goal is for these findings to present Ustaz Hanafi as a role model, influencing both present and future PSSCM members.

Methodology

The study is undertaken in several stages, beginning with a preliminary meeting involving the 3rd President and Guru Utama of PSSCM, Datuk Haji Maideen Kadir Shah, and several prominent figures from PSSCM. This initial phase is followed by scheduling interview appointments with these figures, conducting the actual interviews, transcribing the recorded sessions, and subsequently analyzing the interview content through transcription. Figure 1 illustrates the flow chart of this interview process.

Approximately 15 respondents, who have learned Seni Silat Cekak Malaysia from Ustaz Hanafi and are currently active members of PSSCM, were interviewed for the study. These respondents hail from diverse backgrounds and various states in peninsular Malaysia, collectively amassing over 40 years of experience in PSSCM.
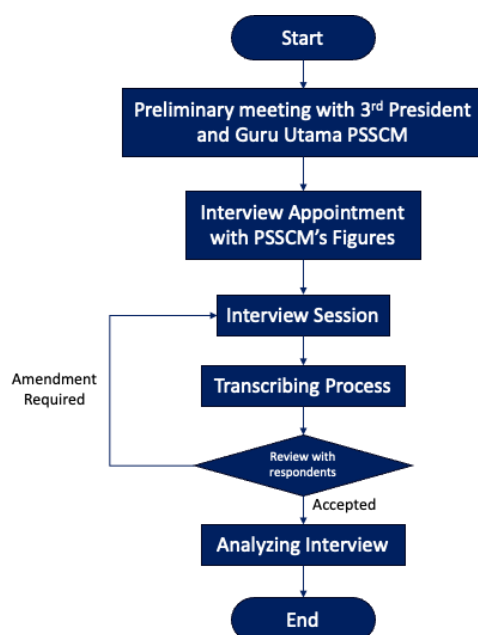
Figure 1: Flowchart of the research

Result and Discussion

Affectionate Teacher and Assimilation of Islamic Teaching Through PSSCM

The initial thematic analysis, derived from interviews with 15 esteemed figures in PSSCM, depicts Ustaz Hanafi as a compassionate instructor who simultaneously imparts Islamic teachings through PSSCM. Safaran notes that although Ustaz Hanafi is a stringent teacher, he shows genuine concern for his students without any discrimination. Abdul Karim echoes this sentiment, affirming that Ustaz Hanafi, while strict, employs an accessible teaching approach, emphasizing his warm-hearted nature. Supporting this viewpoint, Izham & Roziah emphasize in their interviews that Ustaz Hanafi underscores the importance of a strong teacher-student relationship, having close connections with his own students. Zainol adds that Ustaz Hanafi consistently urges all instructors to be warm and approachable to attract new students to learn Silat Cekak.

Ustaz Hanafi's character as a teacher was very outstanding by giving the father-figure vibes towards all his students. Almost all the interviewees responded that Ustaz Hanafi was a strict teacher but at the same time he was approachable and cared for each and every one of his students. This kind of teaching approach was very effective according to (Bhavna Barmi et al, 2023) because by showing affection, only then the teacher will be able to connect with his student on emotional level and build trust. Developed in the 1950s by psychologist and educator Benjamin Bloom, Bloom's Taxonomy stands as a widely embraced pedagogical instrument, playing a pivotal role in shaping the planning and assessment of the teaching and learning process. This methodology categorizes learning objectives into three distinct domains—cognitive, affective, and psychomotor—and establishes a hierarchy that delineates a progressive cycle of learning (Santos et al, 2024). This underscores the importance of emphasizing the emotional connection between teachers and students to ensure the optimal delivery of education.

The second thematic analysis focuses on the integration of Islamic Teaching through PSSCM. According to Rosman, Ustaz Hanafi is adept at guiding individuals who have deviated from Islamic teachings through Silat. Roziah also noted that Ustaz Hanafi consistently underscores the concept of "tawakkal", where individuals entrust the course and outcome of a task to Allah after demonstrating their determination (Alan & Isi, 2023). To further support this perspective, Sabariah highlighted Ustaz Hanafi's extensive knowledge of Islamic teachings, particularly the concept of tawhid, which signifies belief and the testimony that there is no God other than Allah (Tetelepta et al., 2023).

Ustaz Hanafi successfully integrated Islamic teachings into PSSCM as he had previously obtained religious education from an Islamic boarding school (pondok) before teaching Silat. Additionally, he received valuable religious instruction from outstanding teachers of that time, as documented by Halimah in 1978. Consequently, when Ustaz Hanafi later instructed Silat, he effectively incorporated his religious knowledge by blending Islamic teachings with Silat. This approach served as one of his methods for promoting and imparting Islamic principles to the Muslim community.

Martial Art Expert and Professionalism Element in Managing PSSCM as a Leader

Ustaz Hanafi is renowned as a martial arts expert. Not only is he proficient in Silat Cekak, but he is also recognized for his expertise in Silat Sendeng. This acknowledgment comes not only from his students but is explicitly confirmed by four individuals who were interviewed. In his interview, Datuk Haji Maideen remarked, "Ustaz Hanafi has also delved into other martial arts, such as Silat Sendeng." Zafri Miar echoed Datuk Haji Maideen's sentiment, affirming that Ustaz Hanafi possesses substantial experience in Silat Sendeng.

As a distinguished leader and founding father of PSSCM, Ustaz Hanafi is regarded as a visionary figure. Abdul Majid affirmed this assertion by highlighting that Ustaz Hanafi employed the strategy of showcasing practical demonstrations to promote Silat Cekak, aiming to engage and encourage audiences to become members of PSSCM. This is evident in his introduction of Silat Cekak to established universities such as Universiti Sains Malaysia (USM) and Universiti Teknologi MARA (UiTM), formerly known as Institute Teknologi MARA (ITM). The vision of integrating silat cekak into these universities has materialized, with the establishment of seni silat cekak Malaysia as an academic subject at Universiti Sains Malaysia.

This integration is reflected in Figure 1, depicting the demographic of students who have learned silat with Ustaz Hanafi and are still active in Persatuan Seni Silat Cekak Malaysia. The figure illustrates Ustaz Hanafi's strategic focus on both public and university settings. His influence extends beyond traditional boundaries, and the acceptance of silat modernization is evident among the residents of Kuala Lumpur. This sentiment is supported by Mohd Shafie, who expressed in his interview that, "Modernizing the development of silat is crucial for broader public acceptance."

Universiti Sains Malaysia (USM), Pulau Pinang
1. Ar. Dr. Haji Abdul Majid bin Ismail
2. Mr. Zafri Bin Mohd Miar

Jln. Hj. Sirat, Kg. Baru, Kuala Lumpur
1. YM Datuk Haji Maideen bin Kadir Shah
2. The Late Mr. Roslin bin Ali Omar
3. Mr. Safaran Bin Haji Ahmad
4. Mr. Shafie bin Mohd Johari

Jln. Putra, Kg. Baru, Kuala Lumpur
1. Mr. Abdul Karim bin Mohd Saied
2. Mr. Izham bin Ismail
3. Mr. Zainol bin Saifuddin
4. Mr. Rosman bin Mat Deli
5. Dr. Roziah binti Abdullah
6. Mdm. Norida binti Ramli
7. Mdm. Sabariah binti Safar

Universiti Teknologi Mara (UiTM), Shah Alam
1. Mr. Ghazali bin Abdul Rahman
2. Mdm. Faridah binti Abu Bakar

Figure 2: The demographic of respondents

Ustaz Hanafi demonstrates professionalism in teaching silat by maintaining strictness in his Silat Cekak classes while treating all students equally. This characteristic was highlighted by Safaran Haji Ahmad during his interview, as he stated, "Ustaz Hanafi was a strict teacher but deeply concerned about his students, showing no discrimination among them." This

exemplifies Ustaz Hanafi's professionalism in imparting the art of Seni Silat Cekak Malaysia. Abdul Karim Mohd Saied, in his interview, further emphasized this point, noting that Ustaz Hanafi is strict yet employs an easy-to-understand teaching approach, coupled with a warm-hearted demeanor.

Charismatic and Positive Personality

The thematic analysis of the interviews revealed consistent keywords describing Ustaz Hanafi's positive personality. According to Norida, Ustaz Hanafi was characterized as strict, warm-hearted, loving and always emphasizing the importance of honesty in both heart and speech. Sabariah echoed this sentiment by highlighting Ustaz Hanafi's loving and responsible traits while maintaining a soft-spoken demeanor. Additionally, Faridah portrayed Ustaz Hanafi as a casual and easy-going individual that making him approachable across all age levels. Ghazali further remarked that anyone acquainted with him would undoubtedly be awed and captivated by his extraordinary qualities. The positive traits mentioned such as being warm-hearted, patient, wise, morally upright, honest, responsible, soft-spoken, casual, and easy-going, collectively demonstrated Ustaz Hanafi's ability to create a nurturing and supportive environment for his students.

Ustaz Hanafi's warmth and patience contributed to the creation of a safe space for learning, fostering an atmosphere where students feel comfortable expressing themselves. His wisdom and moral integrity served as guiding principles, instilling the importance of making responsible and ethical choices. Furthermore, his honesty fosters a culture of trust and openness, enabling effective communication and constructive feedback. Ustaz Hanafi's loving and caring character enhances personal development and strengthens the bond between teacher and student, promoting a sense of belonging. Moreover, Ustaz Hanafi's soft-spoken and casual demeanor contributes to a relaxed learning atmosphere, encouraging students to perform their Silat Cekak training with comfort and enjoyment. The impact of these positive traits extends beyond technical skills in Silat movement and emphasizing the transformative influence he has on PSSCM members.

The analysis suggests that Ustaz Hanafi possessed charismatic leadership qualities in spearheading PSSCM. His positive personality aligned with characteristics of charismatic leaders, described as magnetic, persuasive, and likable (Murray, 2020). According to charismatic leadership theory, such leaders have the ability to transform the needs, values, and aspirations of followers from self-interests to collective interests and led to a high level of commitment towards achieving the organization's vision and mission (House & Howell, 1992). Additionally, the work of (Nikezić, Doljanica, & Bataveljić, 2013) suggested that charismatic leaders are often regarded in theory as transformational leaders, possessing unique skills that afford them greater influence and personal charisma. Furthermore, a statistical analysis conducted by (Supratman, Entang, & Tukiran, 2021) supported the notion that a charismatic leader's personality significantly influenced the performance of subordinates within an organization. The charismatic and positive personality attributed to Ustaz Hanafi by the respondents unmistakably positions him as a transformative figure in Malay Silat, particularly within the PSSCM members. His leadership style aligns with established theories, emphasizing the profound impact of charisma on organizational commitment and performance.

Conclusions

Drawing from the findings and discussions, it is evident that Ustaz Hanafi possesses extensive knowledge in Islamic teachings, expertise in martial arts, effective leadership skills, a nurturing teaching approach, and a positive personality. The esteemed Ustaz Hanafi played a transformative role in Malay Silat through his contributions to PSSCM education. His notable attributes included firmness, a harmonious rapport with students, articulate communication, genuine warmth, wisdom, and a loving disposition.

Acknowledgements

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The Effect of e-Learning System on Academic Performance in Higher Learning Institutions in Tanzania: Moderating Effect of Behavioral Intention

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Abstract

This research evaluated the direct impact of an e-learning system on academic performance at higher education institutions in Tanzania. The research was guided by the modified Unified Theory of Acceptance and Use of Technology (UTAUT) and used descriptive and explanatory cross-sectional survey research designs. Likewise, the study used the positivism paradigm and a simple random sampling technique to get a sample size of 322 respondents. The data were obtained through administration of questionnaires and the review of relevant documents. The acquired data underwent inferential statistical analysis using Partial Squares Structural Equation Modeling with the assistance of SmartPLS 4. Additionally, descriptive statistical analysis was performed using IBM SPSS Statistics Version 26 to examine the data collected on respondents' profiles. The results indicate that the e-learning system and behavioral intention have a direct impact on academic performance. Nevertheless, the moderation effect of behavioral intention on the link between the e-learning system and academic performance is negligible. The research confirms that both the e-learning system and behavioral intention have a significant impact on academic performance. Thus, it is essential for higher education institutions in Tanzania and other developing nations to take into account the behavioral intentions of students while deploying e-learning systems in order to optimize the academic performance.

Keywords: Academic Performance, Behavioral Intention, e-Learning System and UTAUT

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1. Introduction

Learning is a cognitive process that enables individuals to acquire information, skills, and competencies, which in turn influence their decision-making and behavioral patterns (Suresh et al., 2018; Shatta, 2023; Kuliya & Usman, 2021; Chahal & Rani, 2022; Mailizar et al., 2021; Tawafak et al., 2021; Al-Adwan & Al-Debei, 2023). The primary advantage of e-learning is its effective delivery of educational content (Suresh et al., 2018). This includes improved access to information, easy content updates, personalized instruction, convenient distribution, standardized content, and increased accountability (Suresh et al., 2018; Mailizar et al., 2021; Bhalalusesa et al., 2023; Abramson et al., 2015; Abhirami & Devi, 2022; Kuliya & Usman, 2021; Ramadiani et al., 2017; Revythi & Tselios, 2019; Abramson et al., 2015; Kuliya & Usman, 2021).

Electronic content can be updated more easily compared to printed material, and e-learning technologies enable educators to swiftly and effortlessly alter their content (Chahal & Rani, 2022; Mailizar et al., 2021; Tawafak et al., 2021; Al-Adwan & Al-Debei, 2023). Similarly, in e-learning, learners have the ability to manipulate the content, learning order, speed of learning, timing, and frequently, the media used, enabling them to customize their experience to fulfill their individual learning goals (Suresh et al., 2018; Shatta, 2023; Kuliya & Usman, 2021; Chahal & Rani, 2022; Mailizar et al., 2021; Tawafak et al., 2021; Al-Adwan & Al-Debei, 2023).

The advent of internet technology enables the extensive dissemination of digital material to many consumers concurrently, regardless of time and location (Shatta, 2023; Mailizar et al., 2021). E-learning provides a faster, more cost-effective, and potentially superior alternative to traditional education (Suresh et al., 2018). It should be readily accessible to all individuals due to its transformative impact on the college experience for students worldwide (Shatta, 2023; Bhalalusesa et al., 2023; Abramson et al., 2015; Abhirami & Devi, 2022; Kuliya & Usman, 2021; Ramadiani et al., 2017; Revythi & Tselios, 2019). However, there is an ongoing debate in the current research literature on the use or not use of moderators and mediators in studies related to the adoption of technologies, including the implementation of e-learning (Ogundega, 2019; Nassar et al., 2019; Shatta, 2023; Chen et al., 2011; Dwivedi et al., 2017; Venkatesh et al., 2003; Venkatesh et al., 2012; Venkatesh et al., 2016; Alaba et al., 2020; Abubakar & Ahmad, 2015; Mtebe & Raisamo, 2014; Suresh et al., 2018).

Previous studies have examined the influence of both mediators and moderators on the adoption of technologies, as well as the impact of mediators alone on technology use and academic performance. For instance, Ogundega (2019), Venkatesh et al. (2003) and Nassar et al. (2019) explored the effects of both mediators and moderators on use behavior of technologies. On the other hand, Dwivedi et al. (2017) and Shatta (2023) focused solely on the effects of mediators on technology use and academic performance respectively. Nevertheless, the impact of moderators alone on technology use behavior or academic performance has received little attention (Abubakar & Ahmad, 2015). Thus, the objective of this research was to demonstrate how behavioral intention of students acts as a moderator in strengthening the effect of e-learning system on academic performance in higher learning institutions.

1.1 Constructs Development and Hypotheses Formulation

This study used one construct (behavioral intention) from the modified UTAUT by Dwivedi et al. (2017) and other two constructs (e-learning system and academic performance) from the empirical literature review to develop the research model and formulate the hypotheses (Venkatesh et al., 2003; Venkatesh et al., 2016; Venkatesh et al., 2012; Shatta, 2023; Suresh et al., 2018).

1.1.1 Constructs Development

This study adopted the modified Unified Theory of Acceptance and Use of Technology (UTAUT) by Dwivedi et al. (2017) because of its arguments on moderators and additional of other construct in explaining the variance in users' intention to use Information Technologies (IT). Dwivedi et al. (2017) argues that moderators of gender, age, experience and voluntariness have no impact on linkages of constructs (performance expectancy, effort expectancy, social influence and behavioral intention) and use behavior. This argument was supported by the number of existing prior empirical studies (Shatta, 2023), which dropped the four moderators suggested by the origin UTAUT by Venkatesh et al. (2003) and added the academic performance and e-learning as constructs to explain the variance in user's intention to use IT (Dwivedi et al., 2017; Shatta, 2023; Venkatesh et al., 2016; Venkatesh et al., 2012). Figure 1 shows the direct and indirect elements of the modified UTAUT by Dwivedi et al. (2017).
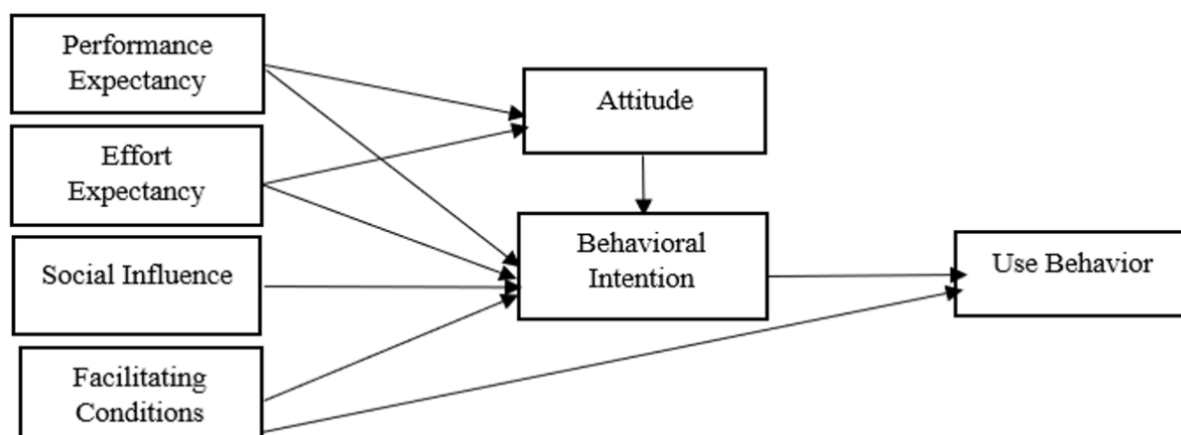
Source: Dwivedi et al. (2017)

Figure 1: *Modified UTAUT*

1.1.2 Hypotheses Formulation

Unlikely the criticisms of prior studies by Shatta (2023) and by Dwivedi et al. (2017), on moderation effect, this study argued that behavioral intention would positively moderate the effect of e-learning system on academic performance in higher learning institutions. The direct moderation of behavioral intention on the effect of e-learning system on academic performance was predicted as new theoretical contribution because the existing theories and models had not comprehended this phenomenon (Chen et al., 2011; Dwivedi et al., 2017; Venkatesh et al., 2003; Venkatesh et al., 2012; Venkatesh et al., 2016). In addition, several studies had predicted the effects of e-learning system and behavioral intention on academic performance (Suresh et al., 2018; Abramson et al., 2015; Kuliya & Usman, 2021; Ramadiani et al., 2017; Revythi & Tselios, 2019) and the findings revealed positive and significant

effects. For the purposes of validating and advancing the findings of the existing theorical and empirical literature, this study thought behavioral intention to use e-learning system would positively moderate the effect of e-learning system on academic performance a substance that had not been tested by prior empirical studies and theories (Dwivedi et al., 2017; Venkatesh et al., 2012; Venkatesh et al., 2016; Chahal & Rani, 2022; Mailizar et al., 2021; Tawafak et al., 2021).

H₁: *Behavioral Intention (BI) would positively and directly effect the Academic Performance (AP)*
H₂: *e-Learning System (eLS) would positively and directly effect the Academic Performance (AP)*
H₃: *Behavioral Intention (BI) would positively moderate the direct effect of e-Learning System on Academic Performance (AP)*

1.1.3 Conceptual Model of the Study

The conceptual model of this study was prepared after getting the concepts from the theoretical and empirical literature. The conceptual model of the study is presented in Figure 2.

Key
- - - - - - ▶ Theoretical Gap
————▶ The relationship which exists in Literature
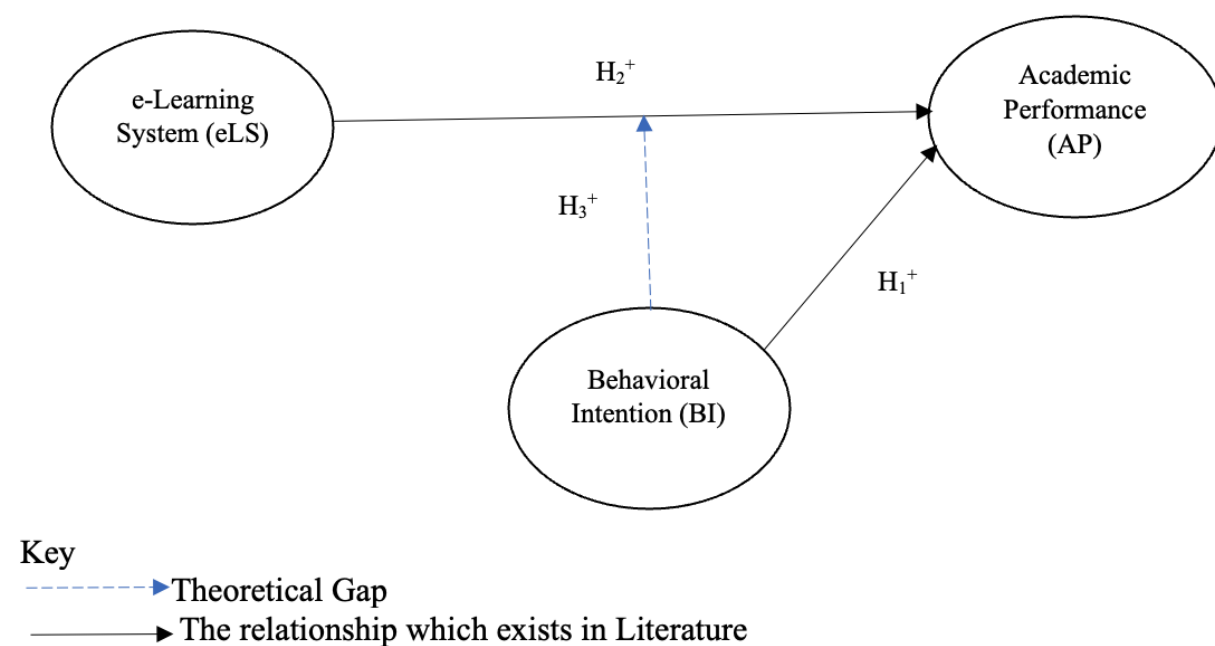
Source: Conceptualized from the Existing Literature, 2023

Figure 2: *Conceptual Model of the Study*

1.1.4 The Mathematical Model for Latent Variable and Its Observed Indicators

This study adopted the mathematical model $x=lY+e$, to display the association between a latent variable and its observed indicators as revealed in Figure 2. x represents the observed indicator variable, Y represents the latent variable, l is the loading which represents a regression coefficient quantifying the strength of the relationship between x and Y, and e represents the random measurement error (Shatta, 2023; Sarstedt et al., 2022).

2. Methodology

2.1 Research Philosophy, Design, Methods and Tools for Data Collection and Analysis

The study used positivism philosophy and an explanatory cross-sectional survey research methodology, which included collecting data once from a specific group by analyzing a sample of that population (Creswell & Plano, 2018). Furthermore, this research used a survey methodology to collect data from two institutions of higher education (National Institute of Transport and Procurement and Supplies Professionals and Technicians Board). This approach was chosen because it enables the collection and quantitative analysis of data using descriptive and inferential statistics.

To fulfill the assumptions of this study, we used the tenth rule guideline offered by Hair et al. (2019) for using PLS-SEM and SmartPLS software in data analysis. This guideline was utilized to validate the minimum number of participants needed to examine the proposed research model. According to Hair et al. (2019), the tenth rule states that the minimum sample size needed to test the hypotheses of the research model is equal to ten times the number of indicators of the exogenous construct. In this study, there were six indicators of behavioral intention and e-learning system, which are considered as exogenous constructs. According to the tenth rule of thumb suggested by Hair et al. (2019), the minimum sample size for this study was 60. However, a sample size of 322 respondents used was enough to test the hypotheses of this research, as it exceeded the minimal requirement of 60 respondents. Furthermore, closed-ended surveys were given numerical values to streamline and enhance the accuracy of quantitative data analysis.

The quantitative data acquired for respondents' profile were evaluated using descriptive statistics, using IBM SPSS Statistics Software Version 26. The inferential statistical analysis for evaluating the hypotheses was conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM) with the assistance of SmartPLS 4 software. The extra answer approach was used to address missing data using the SmartPLS 4 software. This research used the value of 99 as a substitute for seventeen (17) missing values that were included in the questionnaires. Conversely, this approach facilitated the establishment of a consistent distinction between data that was seen and data that was not observed (Hair et al., 2019). The identification of outliers was conducted using IBM SPSS Statistics version 26. This included estimating the frequencies of all variables and assessing their degree of agreement. No anomalies were detected in this study.

2.2 Evaluation of Measurement Model and Structural Model

This study used the criteria set forth by Hair et al. (2019) to assess the measurement model and structural model of the proposed research model. There were four processes involved in examining the reflective measuring models: When evaluating the reliability of indicators, the value should be greater than 0.708. Similarly, when assessing the internal consistency of composite reliability of constructs, the value should also be greater than 0.708. For evaluating the convergent validity of constructs, the Average Variance Extracted (AVE) value should be greater than 0.5. On the other hand, for assessing discriminant validity, the Heterotrait-Monotrait Ratio of Correlations (HTMT) criterion value should be less than 0.9. Similarly, the presence of collinearity among the components of the structural model was investigated. As to Hair et al. (2019), VIF values over 5 suggest the presence of likely collinearity across

the predictor constructs difficulties. However, collinearity issues may also arise with VIF values ranging from 3 to 5. Optimally, the VIF values should be in proximity to 3 or below.

Once collinearity was accounted for, the primary factors used to evaluate the structural model in PLS-SEM were as follows: the path coefficients needed to be statistically significant, with t-statistics above 1.96 at a significance threshold of 0.05 for all pathways. Additionally, p-values of 0.05 or below were considered to indicate significance. The R2 values of 0.75, 0.50, and 0.25 may be categorized as significant, moderate, and weak correspondingly (Hair et al., 2019). Similarly, f^2 effect sizes greater than 0.02, 0.15, and 0.35 indicate small, medium, and large impact sizes respectively (Hair et al., 2019). The predictive relevance, as measured by the Q^2 effect size, should have a value greater than zero (Hair et al., 2019; Becker et al., 2018). In general, the assessment findings for both the measurement and structural models were satisfactory and satisfied all the criteria set by Hair et al. (2019).

3. Results

3.1 Respondents' Profile

The female student participants were around 70 percent of the total, while the male participants constituted approximately 30 percent. The results align with the research findings of Shatta (2023), but contradict the study findings of Bhalalusesa et al. (2023), which reported that 71.4 percent of the participants were men and 28.6 percent were girls. Additionally, it is noteworthy that almost 53 percent of the participants were actively pursuing bachelor's and master's degrees. The results of this research suggest that the data gathered from the participants may be regarded as genuine. Table 1 displays the demographic characteristics of the participants in this study.

Table 1: *Type of Respondent * Education Level Crosstabulation*

	Education level				
	Certificate Level	Diploma Level	Bachelor Degree	Master' Degree	Total
Female Students	80	44	85	15	224
Male Students	10	18	45	25	98
Total	**90**	**62**	**130**	**40**	**322**

3.2 R^2 Values, Relevance of the Path Coefficients and Indicators' Loadings Values

Hair et al. (2019) propose that R^2 values of 0.75, 0.50, and 0.25 might be categorized as considerable, moderate, and weak, respectively. The findings of this research showed that the R^2 values for the endogenous construct was 0.516 without moderator and 0.656 with moderator, suggesting an increase of power after introducing the moderator. According to the established criteria outlined by Hair et al. (2019), the values of 0.516 and 0.656 exceeded the minimal level recommended. These findings suggest that the moderator behavioral intention together with e-learning system accounts for 65.6 percent of the variability in academic performance. Additionally, e-learning system alone explains 51.6 percent of the variability in academic performance. Furthermore, it is noteworthy that all path coefficients had positive relationships, indicating that when one standard deviation rises in behavioral intention and in e-learning system corresponds to an improvement in academic performance. Figure 3 and

Figure 4 display the values of R², the outcomes of path coefficients, and the values of indicators' loadings without and with moderator respectively.
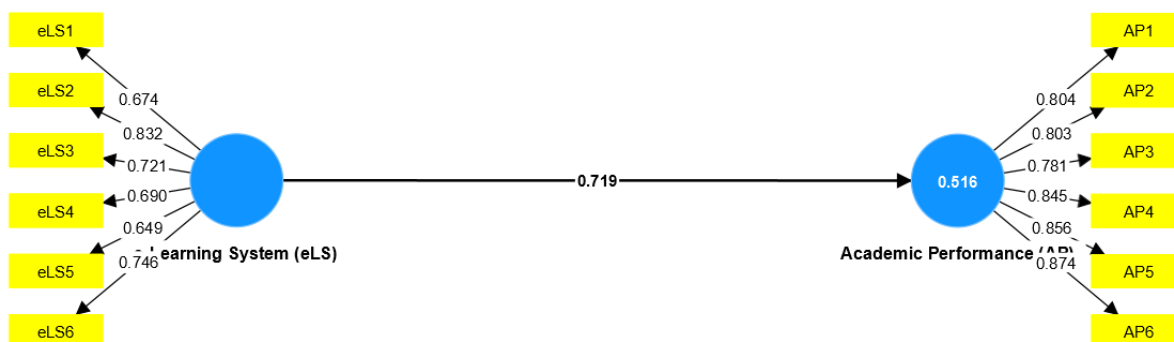
Figure 3: *Values of R² without moderator*
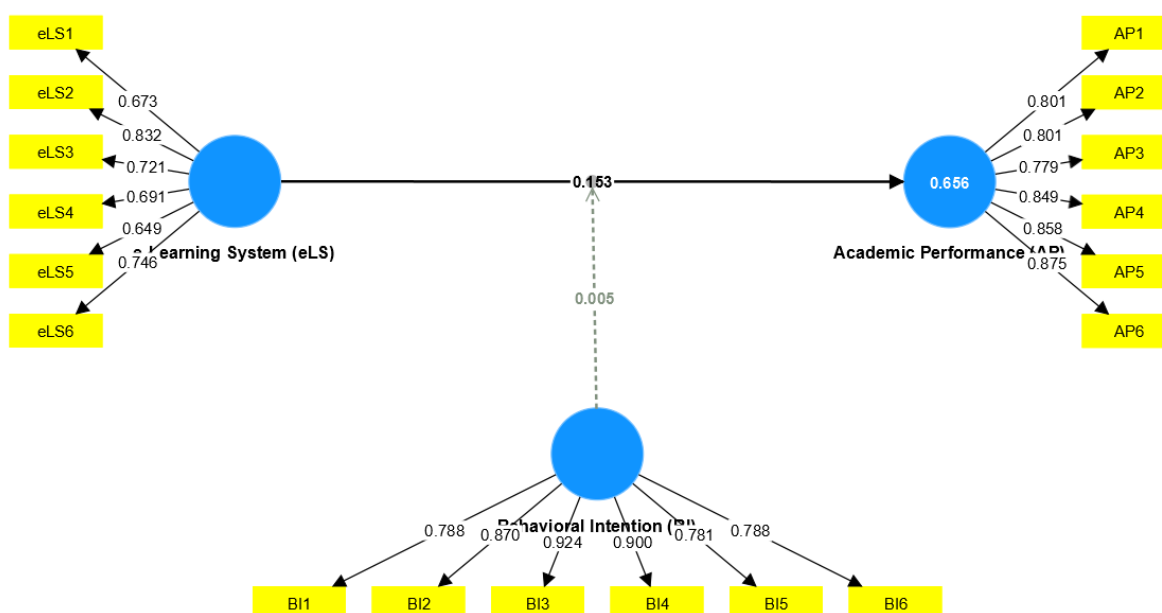
Figure 4: *Values of R² with a moderator*

3.3 Reliability and Convergent Validity

The loadings values of the indicators in Figures 3 and 4 were all greater than 0.708, except eLS1, eLS4 and eLS5 of which were less than 0.708. Based on the findings of Hair et al. (2019), indicators with a reliability value below 0.708 may be considered for removal, but only if their exclusion would result in an improvement in both composite reliability (CR) and Average Variance Extracted (AVE). Based on this evidence, eLS1, eLS4 and eLS5 were not deleted because they did not affect the internal consistent reliability and the convergent validity of all constructs. All Average Variance Extracted (AVE) values, were greater than 0.5 and all composite reliability (CR) values were above 0.708 as shown in Table 2. The findings of this study indicate that there were favourable response patterns observed, and each construct demonstrated convergence in explaining the variability of its respective item (Hair et al., 2019).

Table 2: *Internal Reliability and Convergent Validity Results*

Construct	Composite Reliability (CR)	Average Variance Extracted (AVE)
Academic Performance (AP)	0.929	0.685
Behavioral Intention (BI)	0.937	0.712
e-Learning System (eLS)	0.866	0.520

3.4 Discriminant Validity

This is the extent of how indicators actually represent a construct and how they are different from other construct (Hair et al., 2019). The discriminant validity was assessed based on criteria suggested by Hair et al. (2019) in which the discriminant validity Heterotrait-Monotrait Ratio of Correlations (HTMT) criterion value should be < 0.9. The results for Heterotrait-Monotrait Ratio of Correlations (HTMT) criterion values of this study are presented in Table 3.

Table 3: *Heterotrait-Monotrait Ratio of Correlations (HTMT) Criterion Value Results*

Construct	Academic Performance (AP)	Behavioral Intention (BI)	e-Learning System (eLS)
Behavioral Intention (BI)	0.876		
e-Learning System (eLS)	0.831	0.954	
Behavioral Intention (BI) x e-Learning System (eLS)	0.473	0.581	0.605

3.5 Assessment of Coefficient of Determination (R^2)

Coefficient of determination (R^2) is the variance explained in the endogenous latent variable by exogenous latent variables (Hair et al., 2019). However, Hair et al. (2019) recommended three levels of structural model quality as; substantial (75%), moderate (50%) and weak (25%) respectively. During the assessment of measurement model for this study, the standard PLS algorism was calculated for the main effect model and R^2 value was 0.656, which implied satisfactory because it was above moderate and below substantial (Hair et al., 2019). Table 4 presents the coefficient of determination (R^2) value for this study.

Table 4: *Coefficient of Determination (R^2)*

Endogenous Latent	R-square	R-square adjusted
Academic Performance (AP)	0.656	0.653

3.6 Collinearity Statistics (VIF)

The current research evaluated collinearity statistics by using the variance inflation factor (VIF). The VIF values obtained for all items were below 5, suggesting the lack of collinearity concerns among the predictor constructs in the proposed study model (Hair et al., 2019). The collinearity statistical data for the inner model of the proposed research model, as determined by the VIF metric, are shown in Table 5.

Table 5: *Collinearity Statistics (VIF)*

	Academic Performance (AP)
Behavioral Intention (BI)	3.446
e-Learning System (eLS)	3.435
Behavioral Intention (BI) x e-Learning System (eLS)	1.497

3.7 Significance of the Path Coefficients

After doing bootstrapping analysis, the results indicated significant support for two expected hypotheses, whereas one hypothesis was not supported. The results of this study demonstrate the presence of the two predicted relationships in real-world situations. However, one hypothetical prediction does not manifest in reality. The significance of the path coefficients results are shown in Figure 5.
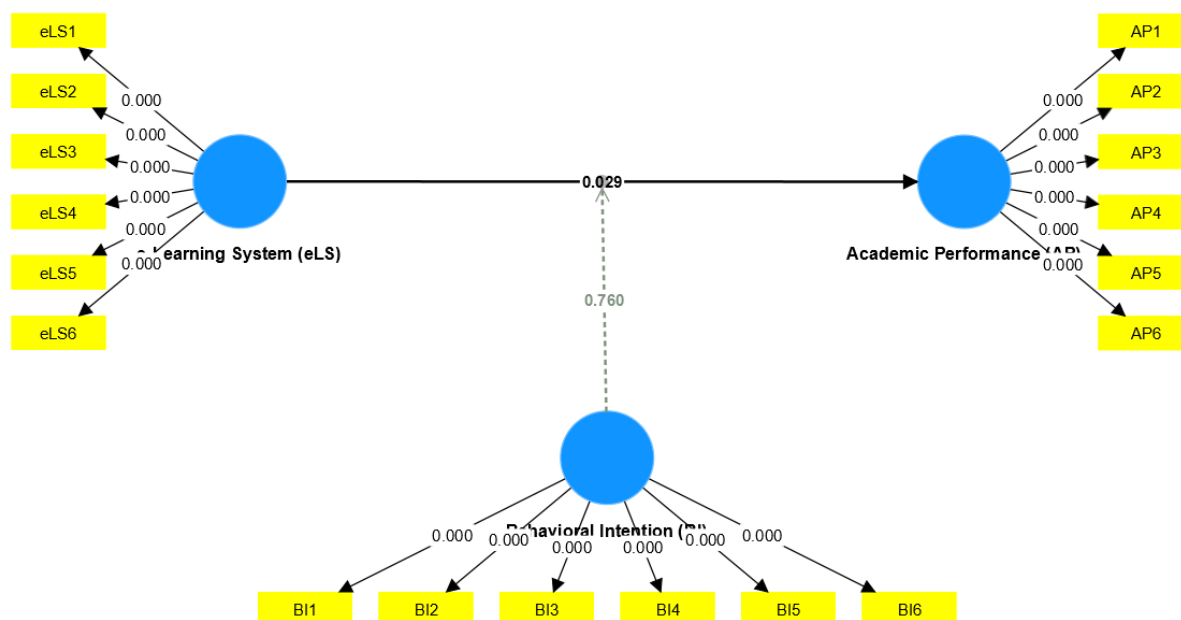
Figure 5: *Significance of the Path Coefficients Results*

3.8 Direct and Moderation Effects of the Hypotheses

Figure 3 presents the results that prove the significant influence of the e-learning system and behavioral intention on academic performance in this study. After opening the report of bootstrapping analysis, Table 6 displays the direct and moderation effects of the hypotheses that were predicted in the research.

Table 6: *Direct and Moderation Effects of the Hypotheses Tested Results*

Hypothesis	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
BI-> AP	0.683	0.670	0.075	9.168	0.000
eLS -> AP	0.153	0.166	0.070	2.184	0.029
BI x eLS -> AP	0.005	0.003	0.016	0.306	0.760

3.9 Importance-Performance Map Analysis Results

The construct of behavioral intention, as depicted in Figure 6, is situated above the average of the importance and performance of the target construct, namely academic performance. This positioning is logical as it suggests the need to prioritize the behavioral intention of students during implementation of the e-learning systems, with the aim of improving overall academic performance in higher learning institutions. On the other hand, the construct e-learning system is seen below the average of importance but it is above the average of performance. This implies that e-learning system has a restricted impact on the target construct (academic

performance). Therefore, it should be considered of lesser relevance in order to improve the academic performance.
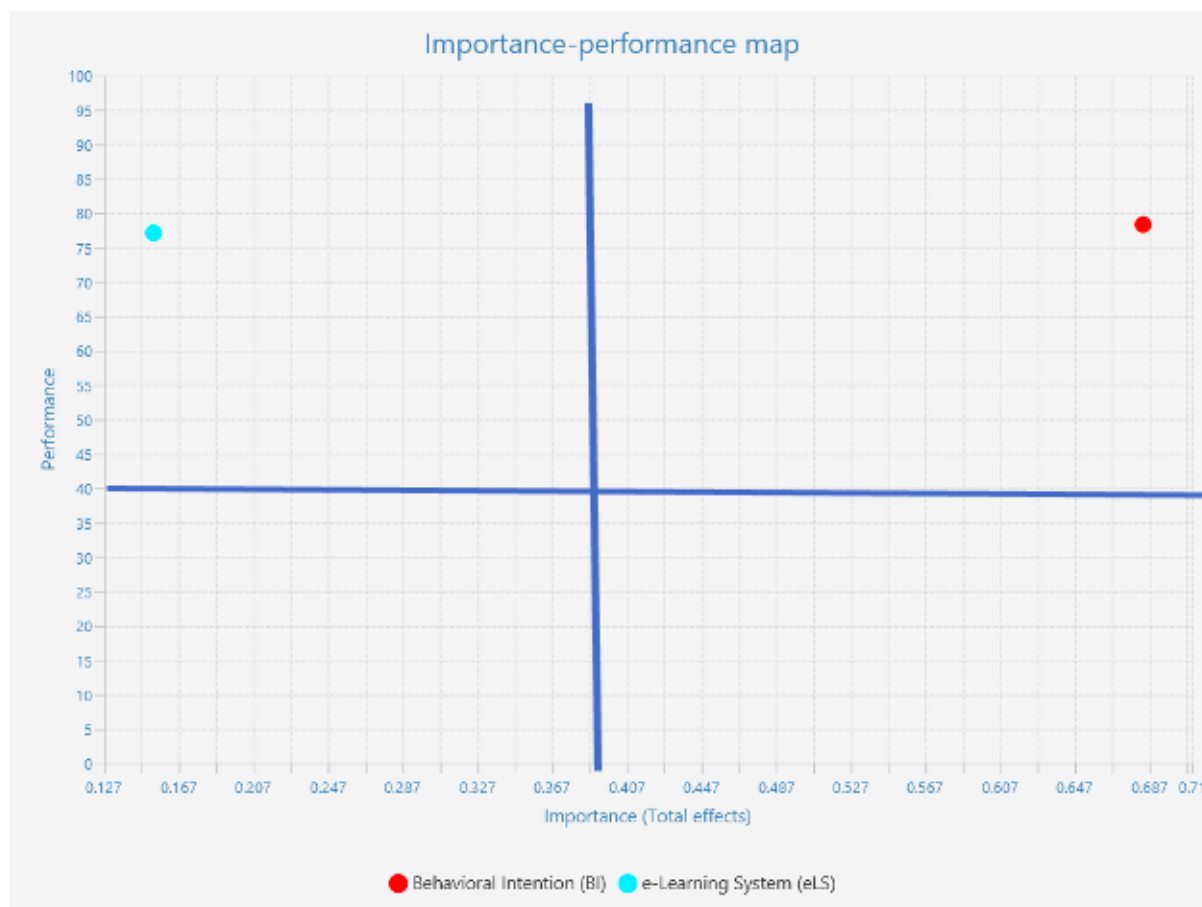
Figure 6: *Importance-Performance Map Analysis Results*

4. Discussion of Results

4.1 The Hypotheses Tested for the Theorized Research Model

This research proposed that behavioral intention would have a direct positive impact on academic performance. The findings revealed positive path coefficient and that there is a direct relationship was statistically significant (p value < 0.05). These findings imply that an increase of one standard deviation of behavioral intention leads to an improvement of academic performance and the correlation exists in real life. The findings align with the current empirical study conducted by Shatta (2023) which revealed that behavioral intention had a significant effect on academic performance (p value < 0.05).

Nevertheless, this research predicted that e-learning system would have a direct impact on academic performance. The findings revealed that there is positive path coefficient, suggesting that an increase of one standard deviation of e-learning system would result in an improvement of academic performance in higher learning institutions. The results of this study align with recent research by Suresh et al. (2018) which found that e-learning had a significant effect on academic performance (p value < 0.05).

Moreover, this research postulated that behavioral intention would moderate the effect of e-learning system on academic performance. The result indicates positive path coefficient, suggesting that when one standard deviation of e-learning system rises would result in a corresponding increase in strengthening the link of academic performance and e-learning system. However, the relationship was found not statistically significant (p value > 0.05) which implies that the correlation does not exist in real life. These results are considered as theoretical contribution since they had not been documented previously by the original and modified UTAUTs (Chen et al., 2011; Dwivedi et al., 2017; Venkatesh et al., 2003; Venkatesh et al., 2012; Venkatesh et al., 2016).

5. Conclusion

5.1 Theoretical Implications

Theoretical contribution has been made to existing modified theories and models as a result of filling the identified theoretical gap, as presented in Figure 7. The moderating effect of behavioral intention on the relationship between e-learning system and academic performance, has been thoroughly understood contrary to the modified UTAUT proposed by Dwivedi et al. (2017). This understanding fills a gap in the existing theoretical literature (Chen et al., 2011; Dwivedi et al., 2017; Venkatesh et al., 2003; Venkatesh et al., 2012; Venkatesh et al., 2016).

Source: Validated Model (2023)
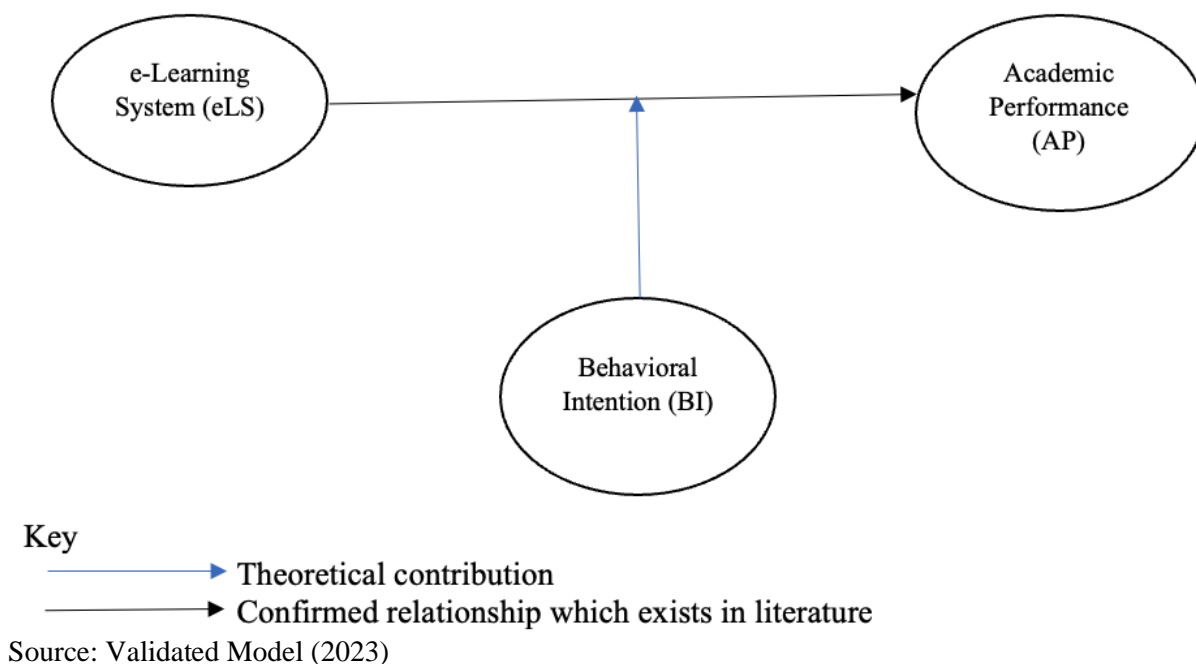
Figure 7: *The conclusive model that has been verified*

5.2 Practical Implications

The statistical significance of behavioral intention and e-learning system on academic performance implies that the improvement of academic performance of students in higher learning institutions will always depend on their behavioral intention to adopt e-learning. This suggests that students will not only rely directly on academic performance when making

decisions about using e-learning systems. However, the behavioral intention can indirectly influence the mindset of students and lead them to implement the e-learning system.

5.3 Limitation and Recommendation for Future Research

This research used one component, namely "behavioral intention," derived from the modified UTAUT framework developed by Dwivedi et al. (2017) and other two elements (e-learning system and academic performance) derived from prior empirical studies by Shatta (2023) and by Suresh et al. (2018). These factors accounted for only 65.6 percent of the variability in academic performance. The study suggests that future research should include more elements from the modified UTAUT by Dwivedi et al. (2017) in order to increase the variance in academic performance from moderate to substantial. Similarly, this research used students only from Tanzania. Given this observation, this study suggests that future research should include students and academic staff from many countries in order to generalize the proposed model.

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Problems and Needs in Experiential Learning in Mathematics: Teachers' and Students' Perspectives From Thailand

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Abstract
This study aimed to explore the teachers' and students' perspectives of problems and needs in Experiential Learning (EL) in Mathematics at secondary education. 31 teachers and 35 grade 11 students from Narathiwat province, Thailand, responded to the questionnaire, which was analyzed for mean and standard deviation (SD). Overall, mathematics teachers had moderate level of problems in EL (mean = 3.21, SD = 0.49). The three major EL problems were: students have not yet developed satisfied metacognitive thinking (mean = 3.65, SD = 0.61), academic achievement (mean = 3.48, SD = 0.77) and mathematical process skills (mean = 3.42, SD = 0.72). Overall, teachers had a high level of needs in EL (mean = 3.98, SD = 0.69). Three major needs were: developing technology skills in EL (mean = 4.16, SD = 0.638), awareness of EL (mean = 4.13, SD = 0.89), and readiness for implementing EL (mean = 4.10, SD = 0.79). The students, overall, had moderate problems of EL (mean = 3.33, SD = 0.58). Three major problems were: 1) students have not yet developed satisfied metacognition (mean = 3.80, SD = 0.83), mathematical process skills (mean = 3.80, SD = 0.99), and academic achievement (mean = 3.77, SD = 1.03). Students had the highest level of needs in EL (mean = 4.24, SD = 0.68). Three major needs were: developing mathematical process skills (mean = 4.49, SD = 0.74), academic achievement (mean = 4.43, SD = 0.70), and readiness for EL (mean = 4.29, SD = 0.67).

Keywords: Problems, Needs, Experiential Learning, Mathematics, Grade 11

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Introduction

Thailand emphasizes high-quality and equitable education for all Thai citizens for driving the success of development of the country. As evident in the Article 54 of Section 5 of Constitution of the Kingdom of Thailand B.E. 2560 (2017) specifies that the Thailand government must ensure that every child receives quality education for 12 years for K-12 (Kindergarten to Grade 12) with free of charge. Furthermore, the Second Amendment of National Education Act of B.E. 2545 (2002), in Article 10 Section 2, states that "… Thai children have equal rights and opportunities to receive quality basic education for at least 12 years without any charge" (Office of the National Education Commission, 2002b). In addition, the National Scheme of Education B.E. 2560-2579 (2017-2036) states about education as:

> Education is a fundamental right for every Thai citizen, and the state is obliged to provide quality education to promote the holistic development of all Thai people. This encompasses fostering intellectual assets that are crucial for developing skills, qualities, and competencies needed for pursuing professions and leading a harmonious life within society. (Office of the National Education Commission, 2002a)

The 2008 Core Curriculum for Basic Education stipulates eight learning subject areas including mathematics as one key learning subject area. Mathematics plays a pivotal role in ensuring students' success in the 21st century learning. Mathematics enables individuals to think creatively, logically, systematically, and analytically. In addition, it allows students to comprehend and solve problems comprehensively and accurately. Students with mathematics skills are capable in forecasting, planning, decision-making, and solving everyday-life problems effectively and appropriately. Moreover, mathematics serves as a tool for students in studying science and technology, as well as other discipline. In sum, mathematics is essential in developing human resource to serve the national capability in competing with other countries (Ministry of Education, 2017).

Learning in the 21st century should stimulate students' interest and active engagement and participation. Students should gain maximum experience to practice various skills and competencies through hands-on learning activities. This approach is aligned with Experiential Learning (EL), which emphasizes real-world learning experiences through active and practical training in real-life situations with cooperative work in order to develop students to possess competencies required by professions and development of the country (Rakthai, Cheeprasop, Singhasaem, Suwanwela, & Leartwanawattana, 2021).

EL is rooted in active learning and stemmed from the concept of "Learning by Doing." It emphasizes ultimate experiences that learners should acquire from their ultimate opportunity to actively engage in practical works and learning. EL also influences learners' new ways of thinking and doing (Sreesukong, 2019). In EL atmosphere, a teacher takes a major role in stimulating students' interest and supporting them to learn through practical skills and processes. EL encourages students' analytical thinking, critical thinking and application of knowledge in daily lives. Students learned with EL will be able to use information technology and communication as tools for research, data collection, and construction of new knowledge. The El process inspires students to produce creative works and innovations. In sum, EL helps develop human resources with the competencies demanded by development of the country in this 21st century world (Daosri et al., 2021).

EL is a learning approach that focuses on students learning from various experiences and actions rather than just receiving information through traditional teaching methods that emphasize memorization. This approach effectively promotes students' knowledge and metacognition in mathematics subject. In mathematics classroom, EL utilizes real-world mathematical problems occurred in student everyday life or real-life situations and requires students to solve such problems effectively. So that, EL helps students think critically and practically in applying their mathematical knowledge in real-world situations.

In addition, mathematics teachers should select and appropriately apply technology and computer programs to support more effective mathematics learning. Students should be given opportunities to solve problems, experiment, and test their mathematical knowledge that will lead them to learn mathematics with more effective, engagement and enjoyment. Collaborative activities are also needed in EL. Students should be encouraged to work cooperatively in groups to solve mathematical problems. The EL activities can help foster knowledge creation and idea sharing among students when learning mathematics. Using EL in mathematics can promote students' problem-solving and inquiry skills, critical thinking, and deep understanding of mathematics. However, from the review of relevant literature in the mathematics education context of Thailand, it is evident that there is a lack of research studying the current situation and needs of EL in teaching and learning mathematics. Therefore, the authors are interested in studying the current situation, problems and needs regarding EL from the teachers' and students' perspectives. In addition, the application of Technological Pedagogical Content Knowledge (TPCK) in EL to be a new learning model of EL is proposed.

Research Questions

The research questions for this study are as follows:
a) What are the current practice, problems and needs in teaching mathematics with EL from the teachers' perspectives?
b) What are the current practice, problems and needs in learning mathematics with EL from students' perspectives?

Research Objectives

The research objectives for this study are:
a) to explore the teachers' perspectives on current practice, problems, and needs in teaching with EL in mathematics;
b) to explore the students' perspectives on current practice, problems, and needs in learning with EL in mathematics.

Literature Review

This section presents the literature review about EL, metacognition, and TPCK. The details are as follows.

Experiential Learning (EL)

EL is an educational approach that focuses on the development of knowledge and skills in learners through numerous experiences and real-world practice. It emphasizes active learning, enabling learners to gain deep understanding and effectively apply their knowledge in real-

life situations. EL involves several teaching steps such as stimulating reflection on prior experiences, presenting meaningful content, emphasizing understanding, training learners to analyze and summarize acquired concepts, practical application in real situations, and transferring knowledge to various contexts. Several educators presented teaching steps of EL as follows.

Tittley (1994) outlines six steps of EL as a) Stimulating learners to reflect on past experiences and connect them with new learning experiences while fostering motivation; b) Presenting meaningful content for learners to grasp; c) Analyzing and summarizing experiences using the information provided by the instructor; d) Summarizing concepts after data collection and analysis, leading to the creation of new experiences; e) Practical application of newly acquired concepts and knowledge to verify and confirm learning; and f) Applying gained knowledge to relevant real-life situations. In addition, Burnard (1996) proposed a four-step process of EL as: a) Accepting learning from prior experiences; b) Learning activities focusing on practice and mutual listening; c) Joint reflection; and d) Constructing new knowledge from practical understanding. Furthermore, Chaiyong (2002) developed a seven-step model for EL as: a) Pre-assessment before encountering new experiences, including an exploration of learners' prior experiences; b) Preparing for new experience by specifying learning objectives, tasks, duties and resources; c) Encountering new experience; d) Reporting progress during experiential phase to reveal students' learning progress as well as encountered problems or obstacles; e) Reporting results to summarize what students gained from each experience; f) Summarizing experience by learners and instructors jointly summarizing the results; and g) Post-assessment after the experience. Petch (2019) mentions a five-step process for EL as: a) Collaborating among students and ae teacher to establish objectives, plan activities, teaching methods, and practice; b) Providing advice, guidance, and directions; c) Reflecting on learners' thoughts and experiences; d) Collaborative summarization for future reference; and e) Evaluating progress based on learners' achievements and the joint outcome. The aforementioned teaching steps are crucial in employing EL for effectively teaching mathematics subject. These steps aid mathematics teachers in designing, planning and presenting mathematics content efficiently in order to enhance students' understanding and the application of mathematical knowledge in their daily lives. Furthermore, teaching tools, information and communication technologies, can be used to help deliver mathematical content effectively. Thus, the use of EL approach is essential to foster students' creativity and the 21st century skills to meet the needs of the country.

EL is an effective learning approach to promote students' development of metacognition and mathematical skills. It is a key to help learners gain deeper understanding and improve their ability to apply their mathematics knowledge in real-world situations. The key teaching steps of El include: a) Stimulating learners to reflect on previous experiences and stimulating motivation; b) Presenting content significantly to encourage learners' perception of challenge; c) Analyzing and summarizing concepts after obtaining data and analyzing gained experiences; d) Practically applying acquired knowledge to verify and confirm new learned knowledge; and e) Applying knowledge in various real-life situations to create new experiences. In common, educators support the review of students' prior knowledge and experiences and the practical application of new knowledge both in the classroom and in real-world situations. EL includes summarization and assessment of students' learning progress. It enhances the value of EL education in promoting students' critical and analytical thinking skills, particularly in the field of mathematics at various educational levels (Tittley, 1994; Burnard, 1996; Chaiyong, 2002; Petch, 2019).

Metacognition

In the field of mathematics, metacognition is essential for students in learning and applying mathematics in their daily lives. Students with metacognition will be able to develop analytical thinking skills, problem-solving abilities, and rational analysis in mathematics. Metacognition can help learners acquire an understanding of fundamental mathematical principles and theories, such as addition, subtraction, multiplication, and division, which lead to a deeper comprehension and application of mathematical knowledge in real-life situations. Metacognition in mathematics enables learners to establish a connection between everyday life situations and knowledge in mathematics. It empowers learners to efficiently apply their mathematical knowledge to solve real-life problems. With metacognition, learners can think critically and appropriately in mathematics and develop strong mathematical skills and the ability to effectively tackle mathematical problems. Metacognition can advance students' abilities in learning mathematics or other related disciplines.

However, developing metacognition in mathematics requires continuous effort and practice from learners. The development of metacognition requires proper and suitable steps. Metacognition in mathematics involves logical, analytic and synthetic thinking of knowledge to address mathematical problems. Learners must be able to recognize the fundamental concepts of mathematics and effectively utilize mathematical knowledge in problem-solving and creating mathematical models. Teaching metacognition in mathematics also involves instructing learners to learn how to present and explain mathematical concepts clearly. Learners should be able to communicate and express their thoughts about mathematical problems in an organized manner, which helps them understand and follow the problem-solving process correctly and appropriately. Therefore, metacognition in mathematics is crucial for developing mathematical skills and solving mathematical problems effectively. Learners should value and invest time in practicing metacognition in mathematics continuously for efficient application of mathematics in daily life (Nirand & Somchat, 2022; Santawan, 2010; Kru With, 2014; Wipada, 2014).

Technological Pedagogical Content Knowledge (TPCK)

In 2008, Koehler and Mishra proposed the conception of Technological Pedagogical Content Knowledge (TPCK), which originally rooted in the conception of Pedagogical Content Knowledge (PCK) being introduced by Shulman in 1986. What is new in is the incorporation of knowledge related to technology, known as Technological Knowledge (TK) in existing PCK. TPCK is originated from the increasing development of technology in the 21st century that significantly impacts teaching and learning in all subjects including mathematics. Subsequently, Thomson and Mishra (2008) named this new construct as Technological Pedagogical Content Knowledge or TPCK. TPCK represents the holistic alignment and integration of three knowledge components i.e., Content Knowledge (CK), Pedagogical Knowledge (PK) and Technological Knowledge (TK) (Srisukong & Buaraphan, 2021).

TPCK, then, is the understanding of how these three forms of knowledge intersect and interact. In practice, TPCK does not mean that educators possess three kinds of understanding i.e., technology, teaching methods, and subject matter, individually. It refers to a teacher's understanding how to blend three knowledge components effectively. In sum, TPCK refers to teachers' ability to apply specific technology appropriately and effectively in teaching specific subject content with specific teaching method.

TPCK highly influences teacher education and professional development. It helps educators make informed decisions about how and when to use technology in the classroom. It emphasizes the importance of balancing three different types of knowledge to ensure that technology serves as a tool for enhancing teaching and learning, rather than just being used for its own sake. TPCK integrates a teacher's knowledge of content, pedagogy, and technology in an integrative manner. Teachers with CK will have strong understanding of the subject matter content that align with the curriculum of the educational institution. Teachers with PK will have strong understanding of the principles of instructional design and be able to employ diverse teaching methods within their subject area. Teachers with TK will understand several technologies (including both hardware e.g., iPads, smart TVs, projectors, and telephones; and software e.g., Microsoft, Google Classroom, and various applications) and be able to select, design and create technology to suit the chosen teaching method, learning process. Then, teachers with TPCK must be able to integrate the mentioned three knowledge components into a single knowledge construct as Figure 1.
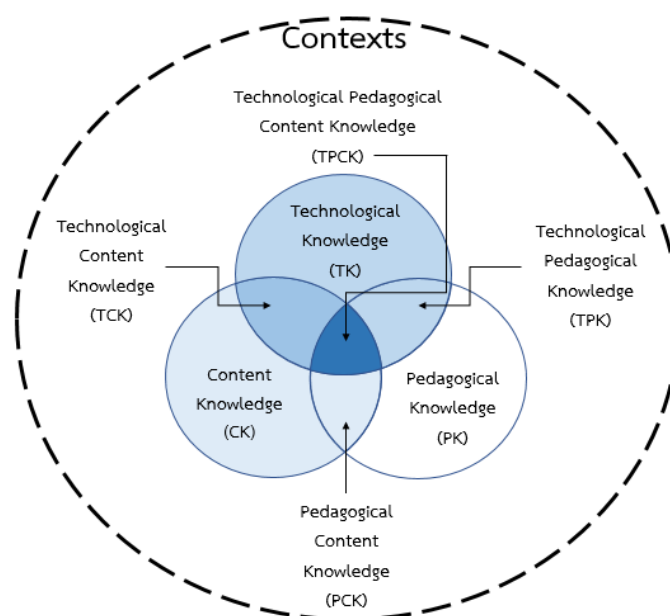
Figure 1: TPCK Framework (Koehler & Mishra, 2008)

In conclusion, a profound understanding of TPCK is paramount in today's educational landscape. TPCK represents the intricate interplay of technological knowledge, pedagogical skills, and content expertise. Educators who master this dynamic framework are better equipped to design and deliver effective, technology-enhanced lessons. They can seamlessly integrate digital tools into the curriculum, enhancing the learning experience and preparing students for the digital age. TPCK empowers teachers to apply technology to tailor their instruction to the unique needs of their students. It bridges the gap between teachers' subject matter expertise and pedagogical strategies, resulting in more engaging, interactive, and impactful teaching.

Research Methodology

This research employs a mixed-method approach, which combines quantitative research and qualitative research methodologies. The quantitative research utilizes survey research, while the qualitative research involves focus group discussions (FGD). This mixed-method

approach will provide more comprehensive understanding to answer research questions. The details of mixed-method research design and data collection are as follows:

Quantitative Research: Survey Research

The population for this research can be divided into two groups: teachers and students. There were 31 teachers participated in the survey research. They all were teachers under the Narathiwat Secondary Education Service Area Office, who experienced in teaching by EL. Data was collected from the entire population. In addition, there were 35 grade 12 students, who already learned in grade 11 and experienced learning with EL with the first author. They all were students in one school under the Narathiwat Secondary Education Service Area Office and data was collected from the entire population.

Data Collection

For collecting quantitative data, the researchers employed two questionnaires: The Problems and Needs in Teaching with EL in Mathematics Questionnaire and The Problems and Needs in Learning with EL in Mathematics Questionnaire. The former was for teachers and the latter was for students. Both questionnaires aimed to explore the respondents' perspectives on problems and needs in teaching or learning with EL in mathematics.

The Problems and Needs in Teaching with EL in Mathematics Questionnaire (for teachers) employed a 5-level rating scale (5 = Very high, 4 = High, 3 = Moderate, 2 = Low and 1 = Very low) and consisted of three parts:
- Part 1: Basic information of respondents (5 items);
- Part 2: Problems and needs in EL, that was divided into two aspects: Problems related to EL (10 items) and Needs related to EL (10 items); and
- Part 3: Suggestions for developing EL (1 item).

The Problems and Needs in Learning with EL in Mathematics Questionnaire (for students) employed a 5-level rating scale and consisted of three parts:
- Part 1: Basic information of respondents (2 items);
- Part 2: Problems and needs in EL, that was divided into two aspects: Problems related to EL (10 items) and Needs related to EL (10 items); and
- Part 3: Suggestions for developing EL (1 item).

Data Analysis

The researchers analyzed data collected from Part 1 of the questionnaire (basic information of the respondents) by counting frequency and calculating for percentage. The researchers calculated the Mean and Standard Deviation (SD) of the data obtained from Part 2 of the questionnaires. The interpretation of the average values was as: 4.21 - 5.00 being interpreted as Very High level and 3.41 - 4.20, 2.61 - 3.40, 1.81 - 2.60, and 1.00 - 1.80 being interpreted as High, Moderate, Low, Very Low levels, respectively. Then, the researcher analyzed data from Part 3 of the questionnaire by content analysis.

Results and Discussion

The results and discussion will be presented according to the research questions and the details are as follows.

Teachers' Perspectives on Problems and Needs in EL

The majority of respondents were female (74.20%). In terms of age, the majority falls within the 31-35 age group (25.80%) followed by the 25-30 age group (22.60%) and the 36-40 age group (19.40%). Regarding their positions, the majority are Senior Professional Level (K3) and others (29.00%) followed by Professional Level (K2) (25.80%) and Practitioner Level (K1) (16.10%). In terms of teaching experience, the majority have less than 6 years of teaching experience (32.30%) followed by 11-15 years of teaching experience (22.60%) and 6-10 years of experience (19.40%). The teachers' perspectives on problems and needs in EL can be presented as Table 1.

	Statement	Mean	SD	Interpretation
Problems in EL				
1.	A school is not yet ready for EL	2.81	0.75	Moderate
2.	Teachers are not yet ready for EL	2.97	0.80	Moderate
3.	Teachers lack knowledge and understanding of EL	3.29	0.82	Moderate
4.	Teachers lack awareness of the importance of EL	3.00	0.82	Moderate
5.	Teachers lack skills in teaching with EL	3.35	0.88	Moderate
6.	Teachers have not yet used technology in EL	3.10	0.98	Moderate
7.	Students are not yet ready for EL	3.06	0.73	Moderate
8.	Students have not yet achieved academic performance at a satisfactory level	3.48	0.77	High
9.	Students have not yet developed mathematics skills and processes at a satisfactory level	3.42	0.72	High
10.	Students have not yet developed metacognition at a satisfactory level	3.65	0.61	High
	Overall Problems	**3.21**	**0.49**	**Moderate**
Needs in EL				
11.	A school needs to be developed the readiness for EL	3.74	0.93	High
12.	Teachers need to be developed their readiness in teaching with EL	4.10	0.79	High
13.	Teachers need to be developed their knowledge and understanding of EL	4.06	0.85	High
14.	Teachers need to be developed their awareness of the importance of EL	4.13	0.89	High
15.	Teachers need to be developed their skills in teaching with EL	4.06	0.89	High
16.	Teachers need to be developed their skills in using technology in EL	4.16	0.64	High
17.	Students need to be developed their readiness for EL	3.81	0.83	High
18.	Students need to be developed their academic performance to a satisfactory level	4.03	0.75	High
19.	Students need to be developed their mathematics skills and processes to a satisfactory level	3.90	0.83	High
20.	Students need to be developed their metacognition to a satisfactory level	3.84	0.93	High
	Overall Needs	**3.98**	**0.69**	**High**

Table 1: Teachers' perspectives on problems and needs in EL

The responding teachers reflected the problems in EL at a Moderate level (mean = 3.21, SD = 0.49). The top three problems in teaching with EL were: Students have not yet developed metacognition at a satisfactory level (mean = 3.65, SD = 0.61); students have not yet developed academic performance at a satisfactory level (mean = 3.48, SD = 0.77); and Students have not yet developed mathematics skills and processes at a satisfactory level (mean = 3.42, SD = 0.72).

The responding teachers reflected a High level of needs in EL (mean = 3.98, SD = 0.69). The top three needs in EL were: Teachers need to be developed their skills in teaching with EL (mean = 4.16, SD = 0.64); Teachers need to be developed their awareness of the importance of EL (mean = 4.13, SD = 0.89); and Teachers need to be developed their readiness in teaching with EL (mean = 4.10, SD = 0.79).

Students' Perspectives on Problems and Needs in EL

There were 35 students responded to the questionnaire. A majority of them were female (60.00%) with 18 years old (77.10%) followed by 17 years old (22.90%). The students reflected their problems and needs in EL as Table 2.

	Statement	Mean	SD	Interpretation
Problems in EL				
1.	A school is not yet ready for EL	3.09	0.89	Moderate
2.	Teachers are not yet ready for EL	3.09	0.74	Moderate
3.	Teachers lack knowledge and understanding of EL	3.09	0.91	Moderate
4.	Teachers lack awareness of the importance of EL	3.63	0.94	Moderate
5.	Teachers lack skills in teaching with EL	3.31	0.99	Moderate
6.	Teachers have not yet used technology in EL	3.14	1.06	Moderate
7.	Students are not yet ready for EL	2.63	1.03	Moderate
8.	Students have not yet achieved academic performance at a satisfactory level	3.77	1.03	High
9.	Students have not yet developed mathematics skills and processes at a satisfactory level	3.80	0.99	High
10.	Students have not yet developed metacognition at a satisfactory level	3.80	0.83	High
	Overall Problems	**3.33**	**0.58**	**Moderate**
Needs in EL				
11.	A school needs to be developed the readiness for EL	3.94	0.94	High
12.	Teachers need to be developed their readiness in teaching with EL	4.17	0.92	High
13.	Teachers need to be developed their knowledge and understanding of EL	4.26	0.85	Very High
14.	Teachers need to be developed their awareness of the importance of EL	4.20	0.96	High
15.	Teachers need to be developed their skills in teaching with EL	4.17	0.92	High
16.	Teachers need to be developed their skills in using technology in EL	4.20	0.87	High

17.	Students need to be developed their readiness for EL	4.29	0.67	Very High
18.	Students need to be developed their academic performance to a satisfactory level	4.43	0.70	Very High
19.	Students need to be developed their mathematics skills and processes to a satisfactory level	4.49	0.74	Very High
20.	Students need to be developed their metacognition to a satisfactory level	4.26	0.74	Very High
	Overall Needs	**4.24**	**0.68**	**Very High**

Table 2: Students perspectives on problems and needs in EL

In overall, students expressed their perspectives on problems in EL at a Moderate level (mean = 3.33, SD = 0.58). The top three problems in learning with EL were: Students have not yet developed metacognition at a satisfactory level (mean = 3.80, SD = 0.83)), followed by Students have not yet developed mathematics skills and processes at a satisfactory level (mean = 3.80, SD = 0.99); and Students have not yet achieved academic performance at a satisfactory level (mean = 3.77, SD = 1.03).

Regarding needs in EL, in overall, students expressed a Very High needs in (mean = 4.24, SD = 0.68). The top three needs were: Students need to be developed their mathematics skills and processes to a satisfactory level (mean = 4.49, SD = 0.74), followed by Students need to be developed their academic performance to a satisfactory level (mean = 4.43, SD = 0.70); and Students need to be developed their readiness for EL (mean = 4.29, SD = 0.67).

The teachers in this study express a moderate level of problems and a high level of needs to teach mathematics with EL; while the students expressed a moderate level of problems and a very high level of needs to learn mathematics with EL. In addition, this study urges for the integration of TPCK and metacognition into existing EL model in order to improve for more effective EL.

Implications

EL is needed in teaching mathematics for students in the 21st century because it yields several benefits for students. However, there are some problems in teaching and learning with EL arisen from this study that mathematics educators need to pay more attention to and be concern about. Such problems need to be solved or released in order to gain better performance in implementing EL in mathematics subjects. In addition, teachers' and students' voices on needs in teaching and learning with EL should be taken into consideration before adjusting the existing EL model or creating a new EL model that better suits the teaching and learning situations. Other additional components such as metacognition and/or TPCK may be needed to be added into an existing EL model in order to enhance students' metacognition and apply technologies to enhance teaching and learning in mathematics. In future research, a larger sample may be needed for more complete picture of the EL teaching and learning situation in Thailand.

Acknowledgment

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Using Incentive Autonomous Learning Strategies to Enhance EFL Chinese Undergraduate Learning Motivation and Speaking Performances: A Proposal

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Abstract
It is well known that Chinese EFL learners face considerable challenges in speaking English. Affective factors such as learning motivation could be a reason for this issue as motivation plays a vital role in language acquisition. Regrettably, Chinese EFL students lack the motivation to prioritize and improve their speaking as speaking is often neglected at the national examination level. On the other hand, autonomous learning emerges as a highly officious way to address the issue of oral English instruction. However, research that incorporates learning motivation, autonomous learning, speaking performance, and incentive strategies is very limited. Thus, this paper attempts to narrow this research gap by proposing incorporating autonomous learning through incentive strategies to improve EFL learners' learning motivation and speaking performance at a public university in China. Adopting an explanatory mixed-methods research approach, the current study will use a quasi-experimental design with purposive sampling where two classes will serve as the experimental and control groups. The 14-week intervention will be implemented in the experimental group, while an in-situ approach will be implemented in the control group. A pretest and post-test data will be collected to check the participants' changes in speaking performance, while a longitudinal survey will be demonstrated to the students to examine their motivation levels before and after the intervention. It is hoped that the study would provide insights into the role of learning motivation and effective teaching strategies to enhance EFL learners' speaking skills.

Keywords: EFL Chinese Undergraduate, Incentive Autonomous Learning Strategies, Learning Motivation, Speaking Performance

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Introduction

Enhancing students' oral English competence marks a significant, persistent, and intricate challenge within the context of foreign language teaching in China. A prevalent issue colloquially referred to as "mute English" is observed in tertiary institutions, which proves to be a difficult predicament to fully rectify (Peng, 2016). Nunan (2007) suggests that a potent strategy to bolster oral English competence is through autonomous learning. Krashen (1982) asserts that affective components such as active motivation can profoundly influence language acquisition. However, it appears that EFL (English as a Foreign Language) students in China lack the necessary motivation for oral English learning (Tang, 2016), raising the critical question of how to adequately stimulate learner motivation. Scholars from the fields of linguistics and psychology have also highlighted the tight connection between learning motivation and learner autonomy (Gao, 2010; Li, 2010; Qin, 2017; Reinders, 2020). According to Jia (2018), a positive correlation exists between an individual's autonomy and learning motivation. Additionally, Ustunlouglu (2017) posits that autonomous learning can cater to students with different learning abilities and meet various learning demands. Therefore, based on the above views, investigating the influence of speaking learning motivation in autonomous learning to enhance the effectiveness of target language instruction and learning is deemed urgent and imperative. However, research focusing on the role of motivation in spoken English concerning the autonomous learning model with incentive strategies, especially among non-English majors in China, remains somewhat limited, lacking systematic and targeted approaches.

Drawing on the second language (L2) motivation theory (Dörnyei, 1994, 2001a) and psychological motivation theory (Dörnyei, 2005), this study seeks to propose a conceptual framework to examine the crucial role of speaking learning motivation in the relationship between an incentive-autonomous-learning-strategies module and EFL learners' oral English competence. Accordingly, this study attempts to achieve the following research objectives.

Research Objectives

Based on the above scholars' theoretical foundation and the analysis of research gap in this research, the following research objectives are put forward as follows:

1. To identify the level of speaking learning motivation among EFL non-English major learners at a public university in China before implementing the incentive-autonomous-learning-strategies based intervention.
2. To identify the level of speaking learning motivation among EFL non-English major learners at a public university in China after implementing the incentive-autonomous-learning-strategies based intervention.
3. To identify whether the incentive-autonomous-learning-strategies based intervention help improve the speaking performance among EFL non-English major learners at a public university in China.

Literature Review

This section sheds light on the EFL research in China and discusses the theoretical foundation for the current research proposal.

EFL Speaking in China

Speaking, an essential language skill involves forming structured verbal expressions to transmit ideas. It's central to English education and manifests a learner's overall proficiency in English (Kahng, 2020). In 2018, China's Ministry of Education issued College English Course Teaching Requirements (trial), emphasizing that the objective of college English education should be more targeted on nurturing students' holistic command of English, with a particular focus on listening and speaking.

Many experts believe that in EFL (English as a Foreign Language) contexts, speaking is more challenging and complex than reading, listening, and writing (Ockey, 2009; Pekarek, 2015; Peng, 2016). Articulating thoughts in a new language isn't straightforward. Speaking is often seen as the primary language skill, evidenced by the term "speakers" for those proficient in a language. Furthermore, learners frequently gauge their language acquisition success by their advancements in spoken communication (Jeon, In'nami, & Koizumi, 2022). This proficiency directly impacts learner's social interactions and individual development (Young, 2011; Van, 2018).

Researchers from China and other areas consistently stress the significance of prioritizing speaking instruction in studies (Qureshi, 2007; Fauzan, 2016; Lin, 2022). In China, speaking teaching is not attached to great importance due to the exclusion of speaking tests in the formal English examination (Gao, 2010). Without external pressure, students themselves often don't feel an intrinsic need to speak English, additionally, students lack effective learning models and instructive guidance from teachers. These issues result in both neglect of speaking teaching and low speaking performance among EFL learners (Deng & Dell, 2023).

According to researchers from psychology and education, there are many factors, such as language learning motivation (Dörnyei, 2001a), autonomous learning (Holec & Little, 2007) and incentive strategies (Zhang, 2022; Gan, 2020; Wang, 2022) may influence learners' speaking skills and competence. The following sections highlight these factors in detail.

Language Learning Motivation

The development from motivation, learning motivation to language learning motivation has experienced a long period, in which the important theories contain self-determination motivation theory, L2 Motivational self-system, and others. In this research, learning motivation is closely related to intrinsic and extrinsic motivation proposed by Gardner and Lambert (1979). The instructor intends to play the role of extrinsic motivation by some inspiring ways to stimulate learners' intrinsic motivation to carry on effective and independent learning.

Some empirical studies have been implemented around language learning motivation, mainly from the perspective of the relationship between learning results and learning motivation. Schmidt (2017) surveyed language learning motivation, and she found that learners with positive and intrinsic language learning motivation are inclined to have much better performance than those with little intrinsic motivation in one aspect of language skill.

Speaking motivation as an important factor in propelling speaking acquisition and teaching (Sukmayasa, 2023) is employed in this study aiming to enhance learner's speaking skills and speaking performance.

Autonomous Learning

Autonomous learning refers to the competence to take control of one's learning (Holec & Little, 2007). This research holds the opinion that autonomous learning is one kind of learning mode, under which, students carry on independent learning with teachers' guidance, methods, and strategies they prefer, learn, explore, and inquire to realize the preset learning goal through their effort.

According to Nunan (2007) and Jia (2018), autonomous learning is an effective way to stimulate and cultivate learners' learning motivation as well as their learning enthusiasm. Unlike other branches under the subject of English, speaking is a comparatively complex skill that needs to be addressed to the individual's differences and needs (Jia, 2018). Thus, autonomous learning carried on by learners themselves may satisfy their different speaking needs and speaking levels.

Besides, the incentive strategies proposed by (Xu, 2020), are adopted to integrate with autonomous learning to help learners stir their speaking motivation and speaking performance.

Incentive Strategies

In China, the specific contents of incentive strategies are proposed by Xu (2020), which incorporate five aspects: interest, participation, goal, confidence, and emotion. The researcher will utilize these strategies during the entire process of oral English teaching. In the pre-learning part, the research will prepare the video relative to each unit theme for students to enjoy, to motivate learners by interest and participation incentive strategies. In class activities, the researcher will invite students to engage in different activities and accomplish corresponding tasks through autonomous learning by applying participation, goal-based, confidence-based, and emotion incentive strategies. In the assessment part, participation, goal-based, confidence-based, and emotion incentive strategies are also applied to motivate them. In this study, the researcher uses the incentive strategies to stimulate students' learning motivation under the autonomous learning model. The cultivation of learning motivation will lay a foundation for further effective learning.

The researcher has discussed the variables associated with speaking motivation, autonomous learning, and the incentive strategies above, which may guide the establishment of the conceptual framework.

The Relationship Among Variables Involved in This Research Proposal: A Conceptual Framework

The current study incorporates and integrates incentive strategies and the autonomous learning model as the theoretical foundation of the speaking module, to improve speaking motivation and speaking performance among Chinese EFL non-English major learners. The speaking motivation served as the crucial role connecting the variable Incentive Autonomous Learning Strategies module and the other variable speaking performance.

After identifying the research objectives above, the conceptual framework is proposed in the following figure, which attempts to investigate the impact of oral English intervention on

EFL Chinese learner speaking learning motivation as well as their oral English performance after the 14-week quasi-experimental teaching.

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                    ┌─────────────────────┐
                    │  English Learning   │
                    │ Motivation among EFL│
                    │  Chinese learners   │
                    └─────────────────────┘
   ┌──────────────────┐              ┌──────────────────────┐
   │ Incentive Autonomous│            │ Speaking performance │
   │ Learning Strategies │──────────▶ │ among EFL Chinese    │
   │      module         │            │      learners        │
   └──────────────────┘              └──────────────────────┘
```
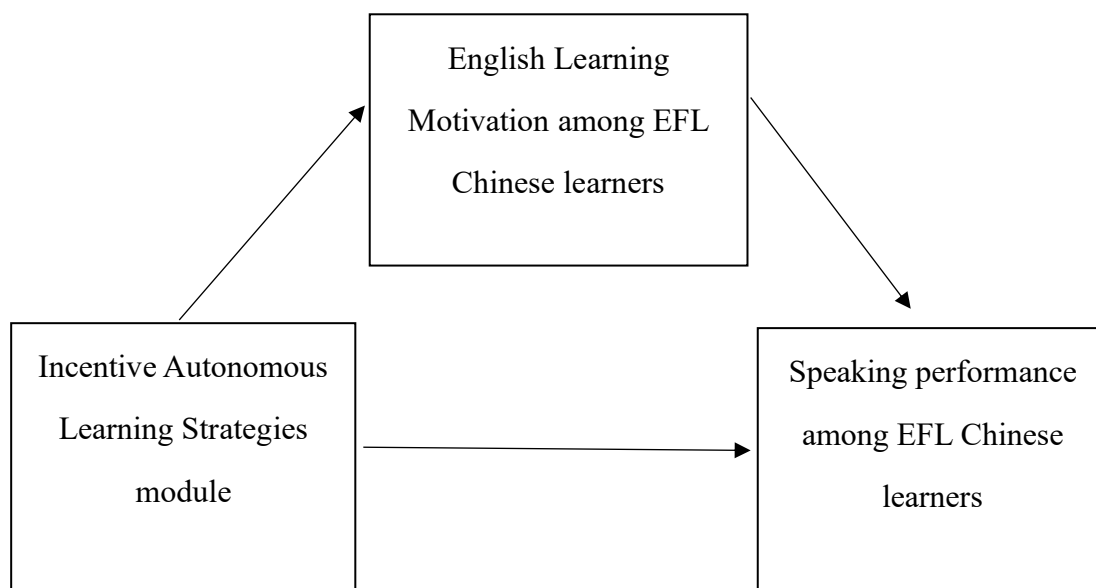
Research Methodology

Utilizing a mixed-methods approach, data will be collected through a quasi-experiment teaching conducted at a public university in China. Concurrently, longitudinal research will be performed by administering a questionnaire to participants to gauge their changes in speaking motivation before and after the intervention.

Participants

The research will adopt a purposive sampling to get two classes involved, representing the control and experimental groups respectively. The quasi-experiment will be undertaken at a public university in China. Non-English major undergraduates in the faculty of Economics and Management at the Chinese university will be selected as the subjects of the experimental process. While the control group consisting of 38 students will receive traditional teaching methods, the experimental group with 40 students will undergo an oral English intervention utilizing incentive autonomous learning strategies (IALS) as shown in Table 1 below.

Research Group		Male	Female	Students' Age
Experimental Group (n=40)		26 65%	14 35%	18-23 100%
Control Group (n=38)		24 63.2%	14 36.8%	18-23 100%

Table 1: Sample of the Study (EFL Learners)

Intervention

This study will adopt the ADDIE Model to develop the incentive-autonomous-learning-strategies based. The ADDIE Model mainly covers five stages: the Analysis Stage is to locate learners' problems and targets they expect to achieve; the Design Stage is to design teaching materials and teaching strategies to use; the Development Stage is to work out a lesson plan; the Implementation Stage is to conduct the intervention; the Evaluation Stage is to evaluate the effectiveness of the intervention.

The module with incentive autonomous learning strategies incorporates the autonomous learning model with the incentive strategies aiming to stimulate and cultivate participants' speaking learning motivation.

After completing the development of the module, the designated intervention will be scheduled to be conducted within 14 weeks during the first semester of the academic year 2023-2024 at the public university in China. The 14-week intervention includes the pretest in Week 1, 12-week teaching activities, and the posttest in Week 14. During the process of intervention, the teaching module will be used in each class with different forms to get learners motivated and activated, thus, enhancing their oral English performance.

Research Instruments and Data Collection

To check the effectiveness of the intervention, different instruments of data collection and analysis will be applied in this research. According to the research objectives, the experimental group will receive the pretest, posttest, intervention, and questionnaires including the motivation questionnaire put forward by Glynn in 2009, the incentive strategies questionnaire developed by Pintrich (2007) and She and Fisher (2000), and the speaking test served as both the pretest and posttest, taken from the 2019-2020 semester one's Speaking Test for non-English major students at the Chinese university, to achieve the corresponding objectives. Among the questionnaires, the motivation questionnaire is longitudinal as the same motivation questionnaire will be assigned and collected twice for participants in the experimental group before and after the intervention. Speaking scores obtained from pre-test and post-test will be collated and analyzed to determine the impact of the intervention on learning motivation and oral English performance; while the control group will accept traditional teaching instruction, only involving the first 2 parts: pretest and posttest.

Research Validity

Validity is termed as the extent to which a concept is accurately measured in a quantitative study (Korb, 2012), which is divided into two main categories as follows, content validity and face validity.

Face Validity

Face validity is the appropriateness, sensibility, or relevance of the test and its items as they appear to the persons answering the test (Holden, 2010). In order to establish face validity of the research instruments, five non-English major students who will not be participating in the real study will be chosen randomly and asked to check the questionnaire items and provide their feedback in terms of its clarity, layout and the language used. Amendments will be made according to the comments obtained from the students.

Content Validity

Content validity refers to the extent to which a research instrument accurately measures all aspects of a construct (Korb, 2012). In order to check the content validity of the Learning Motivation Questionnaire, Incentive Strategies Questionnaire, test, and Oral English Intervention, a panel of three experts with Ph.D. certificates from different fields will be invited to do the evaluation and judgement. One expert from the linguistic field will be invited to verify the suitability, consistency, and coherence of the questionnaires, and the other expert with rich teaching experience will check the rationality and feasibility of the test and the intervention. After their evaluation and analysis, the researcher will do the same as the face validity. Improvements and modification of the questionnaires, tests, and the module will be done based on the responses and feedback from the experts.

Conclusion

This paper establishes a conceptual basis for subsequent implementation of the incentive-autonomous-learning-strategies based module. This study seeks to propose a conceptual framework to examine the crucial role of speaking learning motivation in the relationship between an incentive-autonomous-learning strategies module and EFL learners' oral English competence.

It is hoped that this research could provide theoretical insights through shedding light on the role of motivation in improving the EFL speaking proficiency and enhancing autonomous learning among Chinese EFL learners.

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Feasibility and Acceptance of Micro-Video as an Innovative Teaching Method in Engineering Education

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Abstract
The growing interest in innovative teaching methods within higher education has prompted an exploration of micro-videos as a valuable intervention tool. Grounded in the Technology Acceptance Model (TAM) theory, this study investigates the effectiveness and acceptance of micro-videos as a teaching method in sustainable engineering education, while also identifying the factors that influence students' acceptance of this approach. The study was conducted in three stages. Firstly, semi-structured interviews were conducted with 30 engineering students to gather insights and formulate a TAM-based model for measuring student acceptance. Secondly, an experiment involving 425 year-2 engineering students from a university in China was conducted. The experiment incorporated a preview-test, micro-video viewing, post-view survey, and a post-test. Results indicated a significant 20% increase in post-test scores, indicating improved knowledge acquisition and confirming the effectiveness of micro-video pedagogy. Furthermore, the study found that the "quality of the framework" and "quality of the content" of the micro-videos had a significant impact on students' attitudes towards using this teaching method via structural equation modelling (SEM). This study provides important implications for the future development of innovative teaching methods. By understanding the feasibility and factors affecting acceptance, educators can harness the potential of micro-videos to enhance engineering education.

Keywords: Sustainable Engineering Education, Micro-Videom, Technology Acceptance Model (TAM), Experiment Intervention, Structural Equation Modelling (SEM)

Introduction

The 1987 Brundtland Report by the United Nations spotlighted sustainability as essential for current development without compromising future generations (United Nations General Assembly, 1987). This concept has since permeated global educational strategies, with an emphasis on integrating sustainability in engineering practices and education. As institutions shape future leaders, sustainability education becomes vital. With evolving societal needs, traditional educational methods often lag. Thus, modern pedagogies in sustainable engineering education, such as project-based learning (PBL) and service learning (SL), have emerged as solutions to instill sustainability principles effectively in students (Lozano et al., 2013; Tang, Law, Gary, Tsui and Lo, 2016; Mesa, Esparragoza, and Maury, 2017; Hou and Wu, 2020; Gutierrez-Bucheli et al. 2022).

With technological advancements, micro-video pedagogy, characterized by its brevity and efficiency, has gained prominence in the educational sector (Liu et al., 2022, Hou et al., 2023a). Its versatility spans various disciplines, proving useful on platforms like TikTok and YouTube. Despite its widespread application, the potential of micro-videos in engineering sustainability education remains untapped, and the student reception towards this teaching method is yet to be thoroughly examined. Hence, it is imperative to explore the integration of micro-video in sustainable engineering curricula and understand its impact on student engagement.

This research aims to address the knowledge gap surrounding the practicality of micro-videos as an instructional tool in engineering education, focusing on sustainable development within the built environment. The study will involve engineering students to assess the impact of micro-videos on their understanding of sustainability concepts. Using pre and post-engagement performance metrics and a Technology Acceptance Model framework, the research seeks to evaluate the pedagogical value of micro-videos and understand students' acceptance levels and influencing factors in the academic context.

This study aims to examine the effectiveness of micro-videos in facilitating engineering students' learning of the sustainable built environment knowledge and investigate the factors that affect students' acceptance of using micro-videos in their learning processes. Specific objectives are as follows:
  (1) To investigate the effectiveness of the micro-video in enhancing students' learning outcome
  (2) To identify the factors that influence students' acceptance and perceptions of the micro-video
  (3) To verify the proposed theoretical model using questionnaire survey data

1. Literature Review

1.1 The Importance of Sustainable Engineering Education

Education for Sustainable Development (ESD) emerged in 1987 with the publication of the Brundtland report, establishing it as a significant field (Zaccai, 2012). ESD is defined as an educational approach that fosters the advancement of knowledge, skills, values, and attitudes to enable individuals to thrive in a more sustainable and just society (United Nations Educational, Scientific, and Cultural Organization, 2005). Nowadays, sustainable education can be synergistically integrated with various concepts such as "Sustainability in

Management Education (SME)" (Figueiró and Raufflet, 2015), "Environmental Sustainability Education (ESE)" (Kónya et al., 2021), and "Engineering Education for Sustainable Development (EESD)" (Gutierrez-Bucheli, Kidman, and Reid, 2022) to cultivate sustainability awareness among higher education students and incorporate sustainability principles into their learning experiences.

Among of these concepts, sustainable engineering education plays a vital role in addressing the challenges of sustainable development and securing a more sustainable future. Engineering is key to finding solutions for sustainable development problems (Davidson et al., 2010; Karatzoglou, 2013). The recognition by UNESCO of the influence of engineering on society, ethics, and individual values further underscores the significance of incorporating sustainability into engineering education (UNESCO, 2010).

One of the emerging issues in "engineering unsustainability" is the environmental impact of engineering activities. Depletion of natural resources, greenhouse gas emissions, and environmental contamination are just a few examples of the negative consequences resulting from engineering projects. Promoting sustainability awareness among engineering students and incorporating sustainable engineering education methods are vital steps in addressing these challenges. Universities and educational institutions have recognized this need and have implemented various approaches to advance engineering sustainability education (Juárez-Nájera et al., 2006; Pérez-Foguet et al., 2018). These approaches aim to cultivate a deep understanding of sustainable development principles and equip future engineers with the knowledge, skills, and values necessary to design and implement sustainable solutions.

1.2 Sustainable Engineering Education Approaches

Applying innovative teaching methods in engineering sustainability education is necessary for ensuring that students are equipped with the knowledge and skills to address current and future sustainability challenges (Hou et al., 2023a; b). Various teaching strategies have been developed and tested to enhance the effectiveness of sustainability education. Research shows that more than 22 distinct teaching strategies effectively strengthen sustainability education in various ways (Jeronen et al., 2017). However, as this field constantly evolves, new methods are emerging and being reformed.

Common and effective teaching methods in engineering sustainability education include project-based, service, experiential, interdisciplinary, and active learning, which fall into categories like project-based learning (PBL), service learning (SL), and general engineering sustainability education methods. These approaches enhance critical thinking, problem-solving skills, and sustainability comprehension in students. While pedagogical methods like flipped classrooms and problem-based learning can boost engagement, they may pose challenges such as time intensity, group dynamics, and resource demands (Gutierrez-Bucheli et al. 2022).

In light of these considerations, the incorporation of micro-video into engineering education programmes is appropriate, as micro-video can stimulate students' learning enthusiasm and initiative. (Wang, 2022; Liu et al., 2022; Tian and Tsai, 2021; Wang et al., 2019). Furthermore, with the development of video platforms, video resources are simple to locate, edit, and generate, while internet-based education has become commonplace for students due to its popularity. The subsequent section will therefore introduce the micro-video teaching procedure.

1.3 Micro-Video Learning and Its Feasibility for Engineering Sustainability Education

Micro-video, as a vehicle for micro-learning, is widely used in university teaching (Liu et al., 2022). There is no agreed-upon definition of micro-video, but a variety of explanations exist. Micro-video, which includes micro-films and micro-documentaries, can be recorded and viewed on multi-channel video terminals. Micro-videos can be as short as 30 seconds or as long as 20 minutes. Micro-videos range between 30 seconds and 20 minutes in length. Wistia, a video hosting and analytics company, has provided a definition of micro-videos - micro-videos are typically less than 60 seconds long and are distinguished by their brevity, simplicity, and singular concentration on a single topic or idea. The micro-potential of videos for education derives from their clear visual presentation and concise transmission of information.

Several disciplines have attested to the effectiveness of micro-videos as a teaching aid, including tertiary-level English (Wang, 2022), chemistry (Wang et al., 2019), and physical education (Huang and Yu, 2022). Micro-videos have been shown to substantially improve both student achievement and motivation, as demonstrated, for instance, by the work of Wu et al. (2022) in the field of pharmacology education. Furthermore, Li et al. (2021) demonstrated that the use of micro-videos in biochemistry education helped students develop problem-solving skills and innovate better. In addition, Gong (2021) found that the use of micro-videos in physical education studies increased students' interest in the subject and broadened their perspectives. Moreover, Wang et al., (2018) discovered that embedded real-time operating systems (RTOS) can benefit from micro-video. Micro-videos, in contrast to traditional teaching resources, leverage vibrant and visually engaging content to enhance classroom efficiency, encourage student participation, and make abstract concepts appealing in engineering sustainable development education (Wang, 2022; Liu, 2022).

According to research conducted by Huang and Yu (2022), students' propensity to utilize micro-videos for educational purposes is significantly influenced by the video's production value, the content's applicability to the course, and the platform's user-friendliness. Students' perception of micro-videos' usefulness for learning and their motivation to learn were also significant factors influencing their openness to using micro-videos in the classroom, according to research by Al-Rahmi et al. (2021). Other factors such as the length of the micro-video, the level of interactivity, and the availability of captions or subtitles may also affect students' willingness to use micro-videos for learning (Brame, 2016).

2. Research Methodology

2.1 Design of the Research Activities

To achieve the above objectives, a mixed-methods approach was utilised, combining both quantitative and qualitative research methods. The study is divided into two stages: experiment preparation (*Stage 1*) and experiment implementation (*Stage 2*).

In *Stage 1*, a micro-video was first developed for teaching "street canyon effect" using an animation development software. After that, the video was distributed among 30 students of various academic backgrounds. Students were encouraged to watch the video during the off-classroom time. In-depth interviews were then conducted with the 30 students to collect feedback. After the analysing the interview data, the micro-video was further verified based on the student feedbacks. At the same time, the interview results were examined to identify

the factors that affect students' acceptance to use micro-video and proposed a TAM-based theoretical model.

In the *Stage 2*, an experiment, including a pre-view test and a post-view test, was implemented to test the effectiveness of the micro-video in facilitating students' learning. The pre-view and post-view tests results were analysed to examine the effectiveness of the micro-videos. A questionnaire survey designed based on the TAM-based model was distributed to the experiment participants for verifying the proposed theoretical model.

2.2 Micro-Video Development

An eight-minute micro-video introducing the "street canyon effect" in sustainable urban built environments was created with vibrant animation and sound effects to enhance student engagement. The video underwent feedback collection from 30 students through in-depth interviews, focusing on aspects such as video quality and the effectiveness of the micro-video pedagogical strategy, with the results categorized for data analysis. Table 1 provides the context of the respondents and their main concerns over the micro-video pedagogy.

Table 1: Respondents' background and concerns over the pedagogy

Academic background	Frequencies (%)
Undergraduate	50%(n=15)
Postgraduate	49%(n=14)
PhD	1%(n=1)
Students' concern over the micro-video pedagogy	**Frequencies (%)**
Quality of the micro-video content	83%(n=25)
Quality of the micro-video operation	60%(n=18)
Quality of the micro-video framework	33%(n=10)

2.3 Pre-view and Post-view Tests

The experiment focused on assessing students' comprehension of the "street canyon effects," involving pre-view and post-view tests. The tests, comprising seven questions each, were intentionally set at a slightly more difficult level post-viewing to highlight the micro-video's effectiveness. Students completed test-1 independently before viewing the video, followed by the experiment, and then completed test-2, all administered online with a 10-minute time limit. Figures 1a and 1b depict two examples of questions disseminated to students via an online platform.
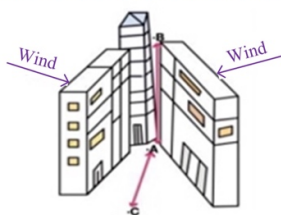
Figure 1a: A question designed in pre-view test

Figure 1b: A question designed in post-view test

Figure 1: Two example questions distributed among students through the online platform

2.4 TAM-Based Model Development

The Technology Acceptance Model (TAM) serves as a primary framework for assessing factors driving students' embrace of micro-video learning. TAM, introduced by Davis in 1989 (Davis, 1989), underscores two pivotal elements influencing technology adoption: perceived usefulness (PU) and perceived ease of use (PEU). PU gauges the potential benefits users anticipate from a technology, while PEU evaluates the anticipated ease of its operation. External elements, like technology characteristics, also impact adoption rates, as highlighted by Liu and Ye (2021). Research by Yang and Su (2017) showed that video production quality, rather than utilitarian factors, significantly influenced student engagement in MOOCs. Further, Brame (2016) emphasized the importance of aligning videos with learning objectives and ensuring technical quality to bolster student engagement. These theoretical insights align with feedback from 30 student interviews.

Therefore, based on previous literature and in-depth interviews, the quality of micro-video as an important factor that affect students' acceptance of the micro-video pedagogy was proposed to be added in the new model. The quality of micro-video is categorised into three components: quality of the micro-video contents (OC), quality of the micro-video framework (QF), and quality of the operation of the micro-video (QO). Figure 2 shows the major constructs of the TAM-based model, in which, QC relates to the micro-module content: the topic/knowledge selection in each video, QF refers to the structure and presentation of the knowledge, and lastly QO refers to students' experience with the online platforms.
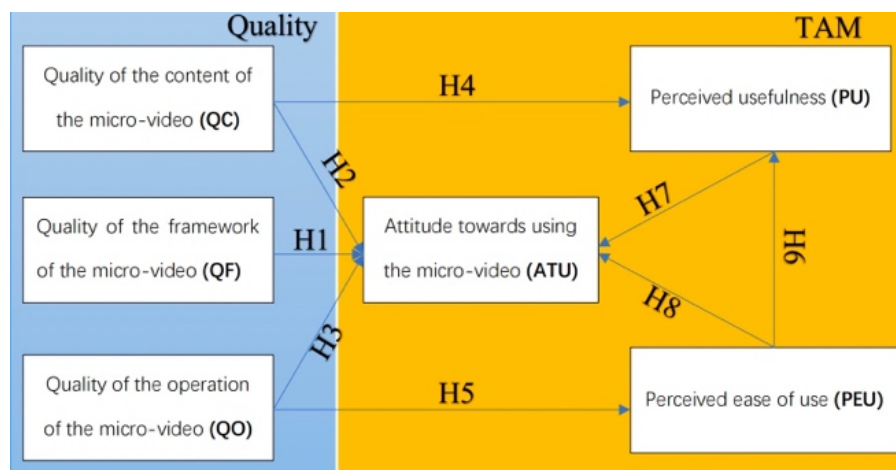
Figure 2: Proposed TAM-based model

The multiple lines shown in the proposed TAM-based model (Figure 2), are possible impact paths identified based on the literature review, in-depth interview, and the classic TAM model.

> H1: The attitude toward using a micro-video is positively affected by the framework of the micro-video.
>
> H2: The attitude toward using a micro-video is positively affected by the contents of the micro-video.
>
> H3: The attitude toward using a micro-video is positively affected by the operation of the micro-video.
>
> H4: The perceived usefulness is positively affected by the micro-video quality of content.
>
> H5: The perceived ease of use is positively affected by the micro-video quality of operation.
>
> H6: Perceived usefulness is positively affected by the perceived ease of use.
>
> H7: The attitude towards using the micro-video is positively affected by the perceived usefulness.
>
> H8: The attitude towards using the micro-video is positively affected by the perceived ease of use.

2.5 Questionnaire Survey Design and Data Collection

A TAM-based questionnaire with 36 seven-point scale questions was utilized to investigate eight hypotheses concerning the perceived quality of micro-videos in sustainable engineering education. The study, involving 425 engineering students, received ethical approval, and data analysis using SPSS 26 and SEM via SPSS and AMOS software provided insights into the relationships between variables, contributing to a comprehensive understanding of the factors influencing students' acceptance of micro-video pedagogy. . The survey obtained human subject ethics application review approval (No. HSEARS20221217003) from the first author's university.

3. Results

3.1 Effectiveness of the Micro-Video Pedagogy

The two online tests received 425 legitimate responses. Table 2 shows the background information of engineering student participants. The two tests received 425 valid questionnaires (>1 minute response time). The online platform automatically recorded the responses of the students and automatically calculated their scores.

Table 2: Background information of engineering student participants

Attributes	Distribution	Respondent% (n=425)
Major	Built Environment	27% (n=113)
	Engineering Management	32% (n=134)
	Civil Engineering	21% (n=91)
	Town & Country Planning	20% (n=87)
Grade	Undergraduate Grade 2	425 (100%)

The study analyzed the results of two tests, revealing a significant improvement in the correct response rate of students after viewing the micro-video. Test-2 showed a notable increase in the average score (22.8) compared to Test-1 (15.7), with a 7% higher rate of faultless scores, indicating the effectiveness of the micro-video pedagogical method in facilitating student learning and knowledge acquisition. Figure 3 displays the results and comparative analysis of the two tests.

	0-5	6-10	11-15	16-20	21-25	26-30	31-35
Test 1	47	42	102	117	27	12	18
Test 2	17	35	60	86	87	84	56
Ratio(test-1)	11%	10%	24%	28%	6%	3%	4%
Ratio(test-2)	4%	8%	14%	20%	20%	20%	13%
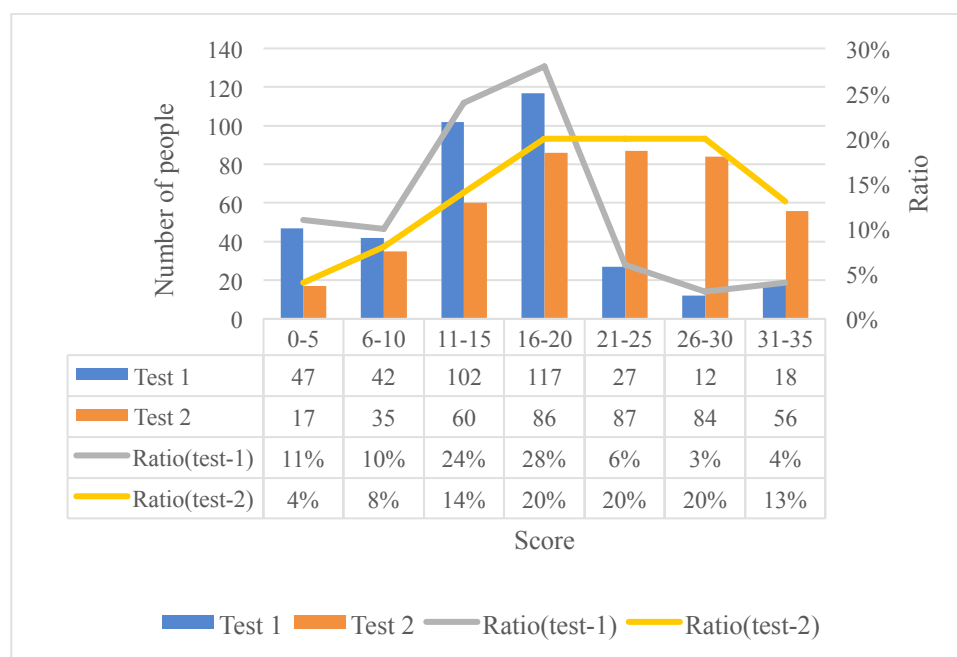
Figure 3: Graphical representation of the test results and their comparisons

3.2 Model Testing and Analytic Results

3.2.1 Reliability and Validity Tests

Cronbach's Alpha was used to determine the questionnaire's internal consistency in this study.

Cronbach's Alpha coefficients for the scale are all greater than 0.7 (PU:0.903; PEU:0.891; QC:0.921; QO:0.856; QF:0.912; ATU: 0.898), suggesting that the questionnaire has adequate internal consistency for use in the present study.

This study used the Kaiser–Meyer–Olkin sampling adequacy measure (KMO) and Bartlett's sphericity test to determine whether the data were suitable for factor analysis. KMO and Bartlett's test analysis results show that the KMO value of the questionnaire is 0.926, which is greater than the standard 0.70, Bartlett's Test of Sphericity is 6789.603, and the P value is 0.00, so it is suitable for factor analysis (Table 3).

Table 3: Test results of KMO and Bartlett's Test

KMO and Bartlett Test		
KMO		0.926
Bartlett test	Approx. Chi-Square	6789.603
	df	406
	P value	0.00

Regarding the factor loadings, as suggested by Hair (2019), items with factor loadings below 0.70 were removed from the model to improve the model and path strength, given that the averages and standard deviations were within the acceptable range. Table 4 shows that, except QO4, all variables had factor loading larger than 0.7. They can all be retained in the model. For QO4, its value is 0.694 and it can also be retained in the model.

Table 4: Results of Confirmatory Factor Analysis

Dimension	Observed variable	Factor loading	S.E.	C.R.	P	CR	AVE
PU	PU1	0.821					
	PU2	0.860	0.058	18.693	***		
	PU3	0.817	0.062	17.391	***	0.655	0.904
	PU4	0.808	0.062	17.114	***		
	PU5	0.734	0.053	15.020	***		
PEU	PEU1	0.830					
	PEU2	0.817	0.058	17.178	***	0.672	0.891
	PEU3	0.818	0.057	17.218	***		
	PEU4	0.814	0.060	17.096	***		
QC	QC1	0.772					
	QC2	0.865	0.061	17.407	***		
	QC3	0.848	0.057	16.988	***	0.667	0.923
	QC4	0.820	0.070	16.303	***		
	QC5	0.813	0.066	16.129	***		
	QC6	0.780	0.073	15.340	***		

	QO1	0.800					
QO	QO2	0.785	0.061	15.179	***	0.607	0.860
	QO3	0.831	0.054	16.144	***		
	QO4	0.694	0.065	13.131	***		
	QF1	0.887					
	QF2	0.827	0.047	19.961	***		
QF	QF3	0.772	0.048	17.729	***	0.676	0.912
	QF4	0.793	0.048	18.573	***		
	QF5	0.827	0.042	19.981	***		
	ATU1	0.805					
	ATU2	0.845	0.057	17.595	***		
ATU	ATU3	0.761	0.054	15.332	***	0.642	0.899
	ATU4	0.754	0.064	15.161	***		
	ATU5	0.836	0.059	17.339	***		

According to the theoretical assumptions, the path relationship of this model was constructed, as shown in the following Figure 4. In the present research, a TAM-based model incorporated six distinct variables, with each adopting a reflective measurement approach. It was imperative to validate that these indicators precisely represented the intended constructs. To determine the robustness and consistency of these indicators, various benchmarks were assessed. The results were promising, with the obtained Cronbach's alpha values surpassing the 0.70 threshold. Additionally, the composite reliability (CR) exceeded 0.60, and the average variance extracted (AVE) from the model surpassed the 0.50 benchmark (shown in Table 4). This implies that the model's indicators are both valid and reliable, meeting the established criteria for effective measurement. Additionally, for adequate discriminant validity, the bold numbers in Table 5 were greater than the corresponding non-bold numbers, indicating that the data achieved good discriminant validity.

Table 5: Correlation analysis and discriminant validity of the dimensions result

Dimension	1	2	3	4	5	6
PU	0. 809					
PEU	0.488	0. 820				
QC	0.358	0.413	0. 817			
QO	0.643	0.493	0.397	0. 779		
QF	0.276	0.302	0.431	0.298	0. 822	
ATU	0.516	0.497	0.458	0.477	0.442	0. 801

3.2.2 Analysis of the Measurement Model

The variables QC, QO, and QF served as independent variables, while PU and PEU served as intermediaries, and ATU served as the dependent variable in the structural equation model developed for this study. The overall model fitting was checked to make sure it was a good fit for the formal survey data. As indicated in Table 6, most indicators were satisfactory following model correction, and GFI and AGFI scores were just below the 0.9 threshold needed to pass evaluation. GFI and AGFI values were above 0.8, which is considered to be

fine by Hair (2019). The proposed model can thus be leveraged for future similar data analyses.

Table 6: Structural equation model fit test results

Reference indicator	x²/df	AGFI	GFI	TLI	NFI	CFI	RMSEA
Evaluation standard	1-3	>0.8	>0.8	>0.9	>0.9	>0.9	<0.08
Statistics	1.892	0. 855	0. 878	0.945	0.901	0.950	0.051
Model fit	yes	yes	yes	yes	yes	yes	yes

To estimate the regression coefficients, this study employs the maximum likelihood technique. The standard errors (SE) of the path coefficients are all positive and there is no outlying phenomenon, as shown in the Table 7. As the absolute value of the corresponding critical value C.R. is greater than 1.96, the regression coefficient value is statistically different from 0.05. When the critical ratio is greater than 1.96, the path coefficient is considered statistically significant at the $p<0.05$ level, and when it is greater than 2.58, at the $p<0.01$ level.

Table 7: Path coefficients and hypothesis test result

	Path		Estimate	S.E.	C.R.	P
QO	←	QF	0.324	0.050	5.407	***
PEU	←	QO	0.526	0.060	8.529	***
QC	←	QF	0.440	0.049	7.548	***
PU	←	QC	0.200	0.048	3.716	***
PU	←	PEU	0.453	0.055	7.726	***
ATU	←	QC	0.167	0.054	2.908	**
ATU	←	QF	0.228	0.048	3.844	***
ATU	←	QO	0.104	0.063	1.607	0.108
ATU	←	PU	0.244	0.064	4.027	***
ATU	←	PEU	0.209	0.069	3.037	**

Note: *** means significant at the 0.001 level; ** means significant at the $p<0.05$ level

Based on the results of the fitting index test shown in the table above, the model fitting index is sufficient for path analysis and hypothesis testing between variables. The model fitting method used in this study is the maximum-likeness method, the non-parametric percentage Bootstrap is used to correct the bias, and the Bias-corrected test method is used to repeat the sampling 2000 times under the condition of a 95% confidence interval (Preacher and Hayes, 2004). In this study, the mediation effect of the structural equation model was analysed, and the specific results are shown in the following Table 8.

Table 8: Mediating effect test result

Parameter	Estimate	Lower	Upper	P
QF-QC-ATU (standardized)	0.073	0.016	0.147	0.011
QF-QO-ATU (standardized)	0.034	-0.017	0.105	0.196
QC-PU-ATU (standardized)	0.049	0.014	0.111	0.002
QO-PEU-ATU (standardized)	0.110	0.035	0.204	0.005

It can be seen from the Table 8 that the indirect influence coefficient of QF-QC-ATU (standardized) is 0.073, the confidence interval of the indirect effect does not include 0, and the p-value is less than 0.05. QC plays an intermediary role between QF and ATU.

4. Discussion - Leveraging Micro-Videos: A Modern Approach to Enhancing Sustainability Education

Micro-videos, with their concise and visually appealing format, have been recognized as a revolutionary tool in the realm of education. As evidenced by a plethora of studies, their rise in the academic domain isn't just a fleeting trend but a testament to their efficacy (Liu et al., 2022; Wang et al., 2019; Wang, 2022;). Particularly, in the context of facilitating sustainable education studies, students' acceptance of micro-video pedagogy is pivotal.

Drawing upon the findings from this empirical study, it is evident that the production quality, content relevancy, and platform's user interface play a significant role in students' inclination towards micro-videos (Huang and Yu, 2022). The findings suggest that when these elements are optimized, micro-videos can offer a richer, more engaging learning experience. This resonates with the broader implications of Al-Rahmi et al. (2021), where students' perception of the usefulness of micro-videos and their intrinsic motivation to learn emerge as critical drivers for their acceptance. It is not just about the video's contents; the surrounding elements, including its duration, interactivity, and the accessibility features like captions, also contribute to its acceptance (Brame, 2016).

Also, the dynamic nature of micro-videos caters to the modern student's learning preferences. Unlike traditional resources, micro-videos, with their vibrant visuals, encapsulate complex, abstract content in a manner that's both engaging and comprehensible. Their mobile-friendly design further amplifies their reach, catering to the on-the-go learning preferences of today's digital-native students (Wang, 2022; Liu, 2022). Furthermore, the inherent structure of micro-videos aligns seamlessly with sustainable education, which often grapples with intricate concepts that need real-world context. The flexibility of micro-videos allows educators to embed real-life instances, making the abstract notions of sustainability tangible.

5. Conclusion

This research explores the effectiveness of micro-video teaching in sustainable engineering education through the lens of the Technology Acceptance Model (TAM). Emphasizing the importance of video quality, the study suggests integrating micro-videos with traditional teaching methods for optimal educational outcomes. Micro-videos, offering real-time insights and engaging storytelling, bridge the gap in sustainable knowledge, democratizing education and transforming abstract concepts into tangible narratives. While the study focused on sustainable built environment, future research could enhance comprehensiveness by comparing micro-video teaching with other methods and exploring a broader range of topics within sustainable engineering. Longitudinal assessments and diverse domain studies could further enrich our understanding of the impact of micro-video pedagogy.

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Constructing the Scale of Transcendent Leadership for Junior High School Principals

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Abstract

In the rapidly changing global organizational environment of today's world, the theory of transcendent leadership has been highly inspiring. Although it has emerged for over a decade, there is currently no related scale available for academic use. Especially in recent years, junior high school principals have faced changing educational environments both within and outside the school, requiring them to possess transcendent leadership thinking and actions. Constructing the scale of transcendent leadership for junior high school principals would be beneficial for the academic research and development of principal leadership studies. Based on this premise, the present study constructs the scale of transcendent leadership by exploring junior high school principals' role positioning and actual practices in school leadership, drawing from the theory of transcendent leadership. The scale has revised through 5 expert reviews and used in a formal questionnaire survey with Taiwanese junior high school teachers as the research participants. A total of 1,580 valid questionnaires were collected. The results of this study establish a questionnaire consisting of 36 items for the junior high school principals' transcendent leadership scale, which can be categorized into four major dimensions and 12 sub-dimensions: 1. "Leadership of Self": character manifestation, self-awareness and regulation, self-spiritual growth. 2. "Leadership of Others ": service orientation, motivating care, fostering spiritual growth. 3. "Leadership of Organization": shared school governance, shaping organizational vision and culture, transcending limitations. 4. "Leadership of Community": establishing community network relations, managing social responsibility, inclusive development.

Keywords: Junior High School Principal, Transcendent Leadership, Scale

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Introduction

In regard to emerging leadership theories such as transcendent leadership, most studies remain confined to theoretical discussions (Cardona, 2000; Crossan & Mazutis, 2008; Crossan, Vera, & Nanjad, 2008; Gardiner & Walker, 2009; Gardiner, 2006). There is a significant dearth of empirical research, necessitating a concerted effort to strengthen the empirical research in this area. Currently, only a few empirical studies exist. For instance, Esmailpour and Nikookar (2017) posit that transcendent leadership can inspire employees to achieve the highest level of work quality, thereby enhancing productivity. Their research, involving a questionnaire survey of 189 employees, reveals that transcendent leadership significantly and positively affects employees' well-being and organizational productivity. Tehubijuluw (2014) examines how transcendent leaders contribute to employees' job satisfaction and utilize it as a mediating variable to assist organizations in achieving business objectives and fostering employee development within the organization. The findings indicate that transcendent leadership enhances organizational performance through the intermediary of increased employee job satisfaction. In the realm of education, Lavery (2012) explores the applicability of the transcendent leadership model to Catholic school principals. The study approaches transcendent leadership from a dual perspective of service and spirituality, infusing the notion of service into all actions of transcendent leaders, particularly their unwavering attention to the needs of partners. Given the limited attention and research dedicated to this emerging leadership concept within the education sector, this study aims to investigate the patterns and applications of transcendent leadership within an educational environment, driven by the primary motivation to fill this research gap.

One of the roles of a principal is to foster a positive working atmosphere within the school and establish educational interactive relationships with school personnel, including teachers. The interplay between teacher behavior and principal behavior serves to establish a conducive school climate for educational activities, thereby facilitating effective educational interactions. Conversely, during unfavorable atmospheres within the school, efforts are directed towards improving the motivation of school staff in order to earnestly pursue the achievement of educational objectives (Bredeson & Johansson, 2000). Consequently, individuals assuming leadership roles within the school shape the organizational climate and cultivate members' commitment to the organization, thereby enhancing the comprehensive competitiveness of human resources. This stands as a crucial issue in advancing school administration in the new century.

Transcendent Leadership

Transcendent leadership differs from traditional leadership in that traditional leadership analysis primarily focuses on individuals and dyadic relationships. Traditional leadership theories predominantly regard leadership within the domain of organizational behavior and adopt a micro-level orientation, while transcendent leadership takes a macro-level approach (Waldman, Javidan, & Varella, 2004). Consequently, transcendent leaders perceive the organization as a closely interconnected whole, capable of translating the vision of organizational development initiatives into benefits for all members of the organization (Kishore & Nair, 2013). Transcendent leadership integrates past definitions of relevant leadership concepts, combining experiential evidence with spiritual dimensions, to become a personalized developmental style for leaders (Drucker, 2005; Snook, Nohria, & Khurana, 2012; Doh, 2011; Campbell, 2007). Specifically, it entails the following facets: 1. Leadership as an Ability: Leadership is a capacity to influence and skillfully guide professional team

members towards specific directions, such as making proactive decisions that enable them to feel capable and accomplished. The transcendent leadership concept provides a holistic perspective and motivation, understanding members' talents and styles, allowing everyone to collectively strive towards a common goal and mutually inspire each other to enhance team success. 2. Genuine Leadership Adaptation: Authentic leaders can adapt the transcendent leadership framework in alignment with their own leadership style, thereby encouraging others to leverage their experiences and ideas and contribute to the work or organization. 3. Key Aspects of Transcendent Leadership: Transcendent leadership involves three critical aspects: (1) Cultivating a transcendent mindset that involves listening to members' voices and empowering and enhancing one's own abilities to set standards beyond personal limits, i.e., transcending status quo; (2) Knowing when to lead and guide the team, and when to step back and allow others to take the lead, granting them opportunities for innovative performance and brilliance; (3) Enhancing social relationship skills in transcendent leadership to harmoniously influence other organizational members, elevating collective efforts towards a shared mission.

Within the three dimensions of leadership of self, leadership of others, and leadership of organization, leaders who excel in just one dimension cannot bring about sustained performance benefits to the organization. For instance, even if adept at leading teams and instilling motivation, commitment, and loyalty in members, leaders still need to exhibit organizational leadership. In the current dynamic environment, effective leadership necessitates aligning leadership actions with the organization's overall strategy and possessing robust self-leadership capabilities to navigate challenging trade-offs in complex decision-making. Leaders lacking self-leadership abilities, lacking strong self-awareness, and lacking moral or character advantages would struggle to confront inevitable tough choices (Crossan & Mazutis, 2008). Therefore, the true essence of transcendent leadership lies in fully harnessing leadership effectiveness across all these dimensions. In addition to the aforementioned three leadership dimensions, Boney (2008), when discussing innovative leadership in modern times, also endorses the transcendent leadership concept put forth by Crossan and colleagues. Boney believes that besides leadership of self, leadership of others, and leadership of organizatio, leadership of community should also be incorporated. This theory suggests that contemporary leaders must transcend the balance between these dimensional demands to achieve long-term sustainable performance. This approach, leveraging findings from the social sciences, aptly addresses the gap in leadership of community.

Method

The measurement scale for principal transcendent leadership employed in this study was developed through a synthesis of relevant literature. The scale encompasses four major dimensions and twelve sub-dimensions: "Leadership of Self" (character manifestation, self-awareness and regulation, self-spiritual growth), "Leadership of Others" (service orientation, motivating care, fostering spiritual growth), "Leadership of Organization" (shared school governance, shaping organizational vision and culture, transcending limitations), and "Leadership of Community" (establishing community network relations, managing social responsibility, inclusive development). Following the development of the self-constructed scale, a panel of five experts reviewed and revised it, resulting in a final set of 36 formal questionnaire items, as provided in Appendix 1. Subsequently, a survey was conducted targeting Taiwanese junior high school teachers in 2020, yielding a total of 1,580 valid responses.

Results

The measurement scale for principal transcendent leadership in this study is divided into four major dimensions and twelve sub-dimensions. It employs a 6-point Likert scoring system, where higher scores indicate a higher level of alignment. The α coefficients after questionnaire analysis ranged from .85 to .96, with an overall scale coefficient of .99, indicating good reliability. To confirm the appropriateness of the scale items, confirmatory factor analysis (CFA) was employed to establish the construct validity of the scale. The CFA results yielded χ^2/df = 8.31, CFI = .94, TLI = .93, RMSEA = .06, SRMR = .05, demonstrating a good fit between the data and the model.

Regarding the latent variable model, principal transcendent leadership falls under a three-order CFA model. To test the normality assumption of the data for each observed indicator, skewness and kurtosis of each observed indicator were examined in this study. The results indicated that all observed indicators met the criteria for skewness values less than 3.0 and kurtosis values less than 10.0 (Kline, 2011), suggesting that the data adhered to the assumption of normal distribution. Subsequently, the intercorrelations among the observed indicators were examined. The results revealed that the correlation coefficients between observed indicators ranged from .20 to .92 and all reached a significant level of .001. This signifies that there exists a certain degree of correlation among the observed indicators, warranting further examination of the model fit.

The CFA was conducted using the maximum likelihood (ML) method, and the standardized parameter estimates are presented in Figure 1. The analysis results indicated that the measurement errors for the observed indicators were all positive values, with no negative error variances observed. Furthermore, all error variances were significant at the .001 level. The standardized parameter estimates for all factor loadings ranged from .66 to .99, predominantly meeting the standard criteria. The standard errors for the estimated parameters ranged from .00 to .02, aligning with the criterion of "no large standard errors" (Byrne, 2001; Hair et al., 2010). The analysis outcomes demonstrated a satisfactory overall fit for the higher-order CFA model.
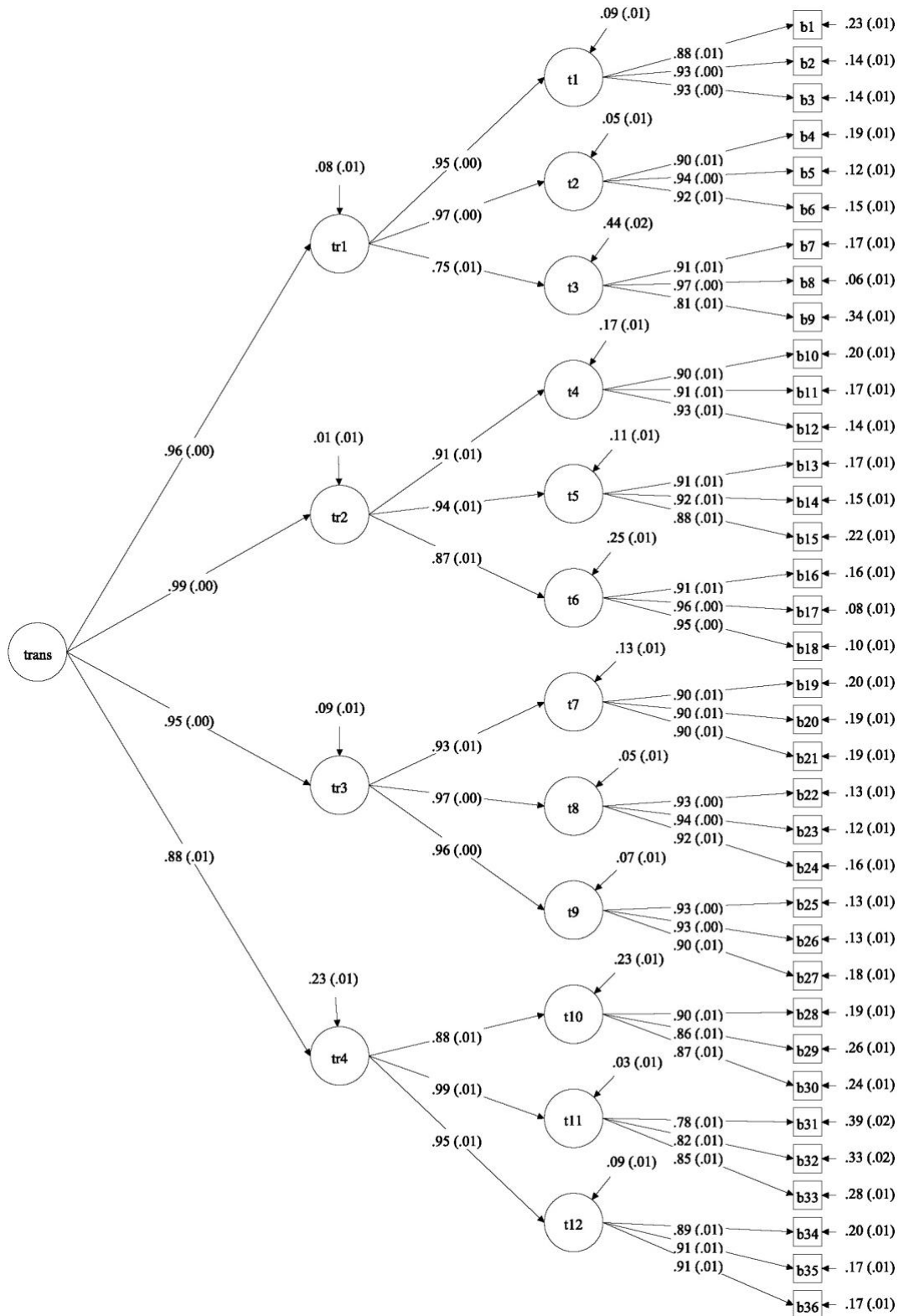
Note: "trans": principal transcendent leadership, "tr1": leadership of self, "tr2": leadership of others, "tr3": leadership of organization, "tr4": leadership of community, "t1": character manifestation, "t2": self-awareness and regulation, "t3": self-spiritual growth, "t4": service orientation, "t5": motivating care, "t6": fostering spiritual growth, "t7": shared school governance, "t8": shaping organizational vision and culture, "t9": transcending limitations, "t10": establishing community network relations, "t11": managing social responsibility, "t12": inclusive development.

Figure 1: The standardized parameter estimates for the three-order CFA of principal transcendent leadership

The questionnaire survey employed a 6-point scale, categorized into five intervals for analysis: high score ranging from 5.01 to 6.00, upper-middle score ranging from 4.01 to 5.00, middle score ranging from 3.01 to 4.00, lower-middle score ranging from 2.01 to 3.00, and low score ranging from 1.00 to 2.00. The analysis results of the descriptive statistics and difference testing for junior high and elementary school principals' transcendent leadership are presented in Table 1. Overall mean analysis from Table 1 reveals that the average score for principal transcendent leadership (M = 4.81) is at the upper-middle level. To ascertain whether there are differences in the current status performances among the dimensions under the research variables, a repeated measured ANOVA was conducted for difference testing. The results indicated a significant mean difference (F = 150.49, p < .001); post hoc comparisons showed that the highest scores were observed in "motivating care" (M = 4.97), "establishing community network relations" (M = 4.96), "service orientation" (M = 4.95), and "character manifestation" (M = 4.93), with "motivating care" significantly higher than "character manifestation." The second-highest group included "self-awareness and regulation" (M = 4.85), "shared school governance" (M = 4.84), and "shaping organizational vision and culture" (M = 4.82), with "self-awareness and regulation" significantly higher than "shaping organizational vision and culture." The third-highest group consisted of "transcending limitations" (M = 4.79) and "self-spiritual growth" (M = 4.77). The fourth-highest group comprised "inclusive development" (M = 4.67) and "managing social responsibility" (M = 4.66). The lowest score was attributed to "fostering spiritual growth" (M = 4.53).

Table 1: Descriptive Statistics and Difference Testing of Principal Transcendent Leadership

	Variable	M	SD
	overall average	4.81	0.77
Leadership of Self	1. character manifestation	4.93	0.84
	2. self-awareness and regulation	4.85	0.87
	3. self-spiritual growth	4.77	0.83
Leadership of Others	4. service orientation	4.95	0.90
	5. motivating care	4.97	0.87
	6. fostering spiritual growth	4.53	0.98
	7. shared school governance	4.84	0.87
Leadership of Organization	8. shaping organizational vision and culture	4.82	0.92
	9. transcending limitations	4.79	0.93
Leadership of Community	10. establishing community network relations	4.96	0.83
	11. managing social responsibility	4.66	0.84
	12. inclusive development	4.67	0.89
F	150.49***		
Post Hoc Tests	5,10,4,1>2,7,8>9,3>12,11>6		
	5>1		
	2>8		

N=1,580   ***p < .001

Conclusion

The junior high school principals are able to exhibit transcendent leadership, with the aspect of setting a personal example in "leadership of self" showing the most pronounced performance. The research findings reveal that the average score for principal transcendent

leadership is at an upper-middle level. This indicates that current junior high school principals are largely capable of demonstrating the expected roles of transcendent leadership. They are able to effectively exhibit self-leadership efficacy through introspective reflection, lead school members through positive leadership activities and charisma, and achieve satisfactory leadership outcomes in interactions with community stakeholders. Moreover, among the four major dimensions of transcendent leadership, principals excel the most in the aspect of "leadership of self," while among the sub-dimensions, "motivating care," "establishing community network relations," "service orientation," and "character manifestation" exhibit the most commendable performances.

This study summarizes the relevant behaviors of junior high school principals in terms of transcendent leadership. In the aspect of leadership of self, they exhibit moral virtues such as compassion, selflessness, loyalty, humility, courtesy, humanitarianism, gratitude, courage, love, and faith. These virtues are transformed into tangible leadership practices to exert leadership effectiveness. Regarding leading others, principals emphasize the establishment of school partnerships, considering the well-being of faculty and staff. Through motivation, empowerment, and humane care, they encourage these individuals to strive for personal growth in order to achieve school development goals.

In terms of organizational leadership, principals foster a collective decision-making mindset and integrate entrepreneurial spirit into the school's vision and culture to inspire the entire faculty. Simultaneously, they possess a forward-looking perspective, adjusting the school's strategies and structures in response to changing external environments. Concerning community leadership, principals involve stakeholders such as parents and community members in the school's developmental environment, establishing strong relationships that collectively enhance educational quality. They also shoulder social responsibilities by guiding community growth and integrating local engagement to achieve sustainable development ideals. They balance school and community management strategies to foster harmonious development between the two.

Appendix

Appendix 1.

The Scale of Transcendent Leadership for Junior High School Principals

Dimension	Sub	Item
Leadership of Self	character manifestation	1. Principals demonstrate strong moral integrity, gaining widespread recognition and emulation from faculty and staff.
		2. Principals translate virtues such as compassion, selflessness, humility, and courage into concrete leadership actions that influence school development.
		3. Principals maintain consistency between words and actions throughout the school's developmental process, earning their reputation as trustworthy leaders.
	self-awareness and regulation	4. Principals engage in self-reflection and self-correction, recognizing and rectifying mistakes in their speech and behavior.
		5. Principals engage in frequent self-reflection and introspection, clarifying the core values of school development to make informed decisions.
		6. Principals possess the ability to adjust their leadership actions in alignment with school development goals.
	self-spiritual growth	7. Principals prioritize their own spiritual well-being.
		8. Principals strive to enhance their own spiritual well-being.
		9. Principals possess a rich spiritual life and are willing to sacrifice personal interests for higher school development goals.
Leadership of Others	service orientation	10. Principals are friendly and considerate towards faculty and staff, offering assistance during times of difficulty.
		11. Principals exhibit humility in serving faculty, staff, and students.
		12. Principals listen to faculty opinions and communicate with respect during interactions.
	motivating care	13. Principals encourage faculty to approach school development with hope and enthusiasm.
		14. Principals inspire faculty's identification with the school, motivating them to contribute beyond personal interests.
		15. Principals take pleasure in motivating and commending exemplary performance among faculty and staff.
	fostering spiritual growth	16. Principals show concern for the spiritual well-being of faculty and staff.
		17. Principals utilize various resources to support the spiritual growth of faculty and staff.
		18. Principals strive to improve the spiritual well-being of faculty and staff, fostering continuous self-improvement.
Leadership of Organization	shared school governance	19. Principals establish diverse communication channels, facilitating the sharing of school development information across the entire school community.
		20. Principals employ various meetings to enable faculty to collectively discuss and decide on the school's developmental direction.
		21. Principals respect the professional opinions of various school organizations and parent associations, incorporating these perspectives into collective school decisions.

	shaping organizational vision and culture	22. Principals shape the school's long-term vision and commit to achieving higher school development goals.
		23. Principals instill a belief in the school's vision among faculty and staff, driving their commitment to realizing school objectives.
		24. Principals create a culture of innovative development, leading the school community to challenge and achieve ambitious goals.
	transcending limitations	25. Principals adjust the school's organizational development strategies and goals based on external environmental changes and needs.
		26. Principals possess foresight, strong ambition, and perseverance, leading the school to continuous breakthroughs in development.
		27. Principals keenly detect potential challenges and crises within the school, respond with appropriate strategies, and guide the school through smoothly.
Leadership of Community	establishing community network relations	28. Principals establish positive relationships with parents and community members, fostering harmonious interaction between the school and its stakeholders.
		29. Principals regularly organize campus events to connect with parents and community members emotionally.
		30. Principals proactively promote school objectives through various means, seeking understanding and endorsement from parents and the community.
	managing social responsibility	31. Principals recognize the close relationship between the school and the community, considering the sentiments of parents and community members in decisions that affect community interests.
		32. Principals organize relevant lifelong learning courses, activities, or workshops to contribute to community development and progress.
		33. Principals share school hardware, software, and resources with the community as needed.
	inclusive development	34. Principals value opinions and suggestions from parents and community members, fostering community consensus and adjusting school objectives as necessary for harmonious development.
		35. Principals integrate community industries or characteristics to develop the school's educational features, enhancing education quality while promoting community development.
		36. Principals understand the developmental needs of the community and encourage parents and community members to participate in school management through various channels, achieving mutual development of the school and the community.

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Experiences of Teachers Handling Students With Twice-Exceptionality

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Abstract

The study was conducted to investigate experiences of teachers handling students with twice-exceptionality. The identified students with twice-exceptionality fit in the operational definition of Gallagher (2006) as all three were diagnosed with Asperger's Syndrome but showed giftedness in the areas of languages and Science. A qualitative single case study was employed which used the transcribed interviews from the respondents for thematic analysis. The researcher looked into their successes along the process and sought to identify the issues and challenges that the teachers encountered along the journey. The findings included: (a) teachers handling students with twice-exceptionality had positive and challenging experiences; (b) teachers handling students with twice-exceptionality found effective strategies based on their experiences; (c) teachers handling students with twice-exceptionality encountered challenges and issues which were recorded in this study. The positive experiences of teachers handling students with twice-exceptionality included: teacher improvement and inspiring experience. The negative experiences included: required effort and no prior experience. The recorded successes of the teachers included: identification of the child's strength and constant communication; encouragement; follow-up works; communication with parents and use of Montessori method. Moreover, the challenges and issues and problems by the teachers included: social or peer relationship, accepting defeats and teachers' lack of experience. The recommendations of this study are: for teachers to have training programs or courses related to twice-exceptionality, an available recommended checklist on the characteristics of students with twice-exceptionality, specific policy/cies and other laws intended for students with twice-exceptionality, and for strengthened parent-teacher partnership to be continued.

Keywords: Twice-Exceptionality, Giftedness, Montessori Method

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Introduction

The noble profession of teaching becomes more meaningful when educators effectively impart knowledge to all students - students with disabilities, students who are differently abled, and even to the gifted ones. The nobility of this work does not exempt it from challenges especially in the area of handling different learners. Among these learners are students identified with giftedness. Gifted learners are students who give evidence of high achievement capability in the areas of intellectual, creative, artistic, leadership capacity, or specific academic fields. With the frequent school- related problems that they face include difficulty enduring boredom, negative attitudes of peers, difficulty to understand others, introversion, perfection, impatience, and intolerance (David, 2018). However, when the student is not only gifted but also exhibit one or more specific learning difficulties such as forgetfulness, poor organizational skills, poor peer relationships, low self- esteem, and demonstration of school failure, the teachers' problem becomes more complicated.

Teachers handling students with twice-exceptionality are expected to meet their needs the same way regular students and those with disabilities are catered in the classrooms. This is the ideal situation. However, this task becomes more arduous if the teachers lack prior knowledge or experience in teaching this type of student. Add to this the challenge in misidentification or late identification of the students' needs which hinders the teachers' work. Pawilen (2018) stated that there is a current movement in the Philippines through the Department of Education (DepEd) in developing its first national gifted education curriculum standard to be used in the country.

Additionally, the department has long ago recognized the urgency to address the problem of the implementation of inclusive education for students with disabilities in the country through the DepEd Order 72 series 2009. Students with twice-exceptionality unfortunately don't have specific category to belong in the above-mentioned priorities of the Department of Education making it more difficult on the part of the teachers to address their presence in the classrooms. At present, the entire Philippine education system continues to be challenged with the proper implementation of high-quality inclusion (Muega, 2016). Teachers have the responsibility to meet the needs of all students including students with twice-exceptionality.

There is more than enough international representation of twice- exceptionality even in the neighboring Asian countries. Yet in the Philippine set-up; the country still lacks empirical data about this phenomenon. While twice-exceptional studies are highly emerging in the west, its context locally needs more study.

For the purpose of this single case study, the researcher used the identified categories and characteristics by Gallagher (2006). Who are students with twice-exceptionality? The National Education Association published a journal entitled "The Twice Exceptional Dilemma" which gave a summary of the three categories where students with twice-exceptionality may be found. The first category are those formally students identified as gifted. The giftedness clouds the disability. The second category are those student formally identified a having disability. This time, it's the disability that masks the giftedness. The third category is those students not formally identified as gifted or disabled. The giftedness and disability components mask one another. It is quite complicated to identify students with twice-exceptionality. No wonder teachers, even the trained ones, are required both awareness and knowledge to employ assessment and identification methods.

Students with twice-exceptionality can be specifically identified according to the following types:
- Gifted with Physical Disabilities
- Gifted with Sensory Disabilities
- Gifted with Asperger's Syndrome
- Gifted with Emotional and/Behavioral Disorders
- Gifted with ADHD
- Gifted with Learning Disabilities

According to a journal entitled "Inclusive Education in the Philippines: Through the Eyes of Teachers, Administrators, and Parents of Children with Special Needs", teacher participants in inclusive education have expressed concern over the lack of training among teachers accommodating students who are differently abled and those with special needs (Muega, 2016). Clearly, teachers implementing inclusive education require proper information and skills through trainings so that high-level inclusive education is attained.

This qualitative research used a single-case design to examine the experiences of teachers handling students with twice-exceptionality. Starman (2013) quoted Sturman (1997) in defining a case study as a general term for exploring an individual, group or phenomenon. It is therefore the complete description of an individual's case and its analysis. This includes the description of the case and thorough explanation of the discovery process of research on its own. In the same journal of Contemporary Educational Studies (2013), a supporting definition of a case study by Sagadin (1991) stated that a case study is used to analyse and describe each person individually, or a group of people, process, phenomenon, or an institution in detail. There is an emphasis on the idea that cases are generated and evolve over time and that events occur in "that particular time and particular place".

Additionally, this research interviewed 8 teachers and the three parents of students with twice-exceptionality. Creswell (2013) explained that as an investigation of one or more cases over time through a detailed data gathering collection, the sources of information comes in multiple forms. This results in triangulation, which strengthens the validity of this study.

Participants

This research used purposeful sampling using a selection criterion based on the following: teachers handling students with twice-exceptionality and parents of students with twice-exceptionality. The process of finding the participants was as follow: the researcher looked for three students with twice- exceptionality from three different schools. Afterwards, the researcher selected eight teachers who handled the selected students with twice-exceptionality. These teachers were identified through homogenous purposive sampling. The homogenous sample was created on the basis that the teachers who participated in this research all handled students with twice- exceptionality. The students with twice-exceptionality were diagnosed with Asperger's syndrome and at the same time showed giftedness in the areas of languages and science. Moving on, the researcher gathered data through interviews from the identified teachers who handled students with twice-exceptionality. Additionally, the researcher also interviewed the three parents of students with twice-exceptionality as an important element of this case study. This is to strengthen the validity of this research.

From the 8 teachers interviewed for this study, the first three taught in a private Montessori school. The next three teachers work in a private school affiliated with the British International School with many branches in the Philippines. Lastly, the two remaining teachers worked in a Special Education Center Davao City. They were identified through a criterion sample technique wherein they shared the same school activities as teachers of students with twice-exceptionality, performed the same tasks in their respective schools, and engaged with the same group of people such as their student with twice- exceptionality as well as their parents. The criteria used for the selection of other participants apart from the teachers were the following: (a) teachers handling students with twice-exceptionality diagnosed with Asperger's syndrome and gifted in languages and sciences, and (b) parents of the students with twice-exceptionality. Presented in Table 1 are profiles of the teacher participants of this research.

Table 1: Profile of the Teachers handling Students with Twice-Exceptionality

Pseudonym	Age	No. of years teaching	Type of School
Teacher 1/T1	45	23 years	Private-Montessori
Teacher 2/T2	25	5 years	Private-Montessori
Teacher 3/T3	36	13 years	Private-Montessori
Teacher 4/T4	26	5 years	Private-British Int'l
Teacher 5/T5	23	3 years	Private- British Int'l
Teacher 6/T6	25	4 years	Private- British Int'l
Teacher 7/T7	41	15 years	Public-SPED Center
Teacher 8/T8	37	13 years	Public- SPED Center

Sampling Design

The researcher used a purposeful sampling technique. This is the use of homogenous sampling that is specifically purposive. The participants were teachers handling students with twice-exceptionality diagnosed with Asperger's syndrome and showed giftedness in languages and sciences. They all handled students with twice-exceptionality in a regular class. Aside from that, these teachers also performed common activities related to students with twice exceptionality. The researcher decided on the bases of the above-mentioned commonalities of the respondents whether they share significant and meaningful experiences concerning twice-exceptionality (Yüksel & Yıldırım, 2015). Parents were also interviewed for triangulation purposes.

Research Instruments

The researcher secured the records made available by the school where these teachers work as guide tools to know the status of the students with twice-exceptionality. These served as a guide during the whole duration of the data gathering procedures.

The researcher also prepared the following research instruments to obtain the necessary information for this study. The first instrument was the semi-structured questionnaires for the series of interviews focusing on the experiences of teachers handling students with twice-exceptionality. Another set of semi-structured questionnaire for parents was also used for this study. The researcher prepared a set of questions that lead the participants to share and describe their experiences as teachers handling twice-exceptionality as well as the parents (See Appendix B). Moreover, the research questionnaires underwent validation (See Appendix C). Furthermore, the researcher also gathered observational and anecdotal reports from the teachers that gave description of the performance of the students with twice-exceptionality while under their classes. These are present in the Students' Portfolios.

Data Gathering Procedure

The data gathering procedure ensured the permission letter from the office of the Dean of the College of Education, University of Southeastern Philippines, Davao City to the Head of School of a private school where the participants of the study work. This same process was also done for the teachers working in a public school. The letter contained the request for the study to be approved for the conduct of the institution. It also declared the purpose, statement of the problem, instruments to be used, and the participants.

Data Analysis

Thematic analysis was selected as the research approach for this investigation. It is the process of identifying patterns or themes within the qualitative data (Maguire & Delahunt, 2017). Additionally, the goal of a thematic analysis is to recognize themes or patterns in the data that are significant or noteworthy. Moreover, these themes or patterns are then used to address the research or its issues. To put it simply, it's not just summarizing the data but rather making sense out of the summarized data that makes a good thematic analysis. Braun and Clark (2006) as cited by Maguire & Delahunt (2017) described the two levels of themes, advising researchers to practice identifying the latent level wherein the ultimate goal of the study is to investigate the underlying ideas, assumptions, and conceptualizations, and ideologies that were theorized in shaping the sematic content of the data.

To ensure the objectivity of this study, the researcher gathered another set of data for triangulation to validate the outcome of this research. Creswell (2013) mentioned that the use of triangulation gives validity to the findings of the study.

Ethical Considerations

For this research, the researcher sent approval letters as part of the preliminary procedures before starting the research and conducting the interviews with the participants. This was to ensure that they understood the purpose and methods of the research. The participants will be kept completely anonymous or assigned with aliases in the research and were fully aware that the observation records from this research will remain confidential so that readers may not know their identities.

The participants were also thoroughly informed of the rationale of the study before the onset of the data gathering procedures. This includes discussion of the activities that they will participate and the general questions that were asked from them which will be part of the consent letter.

Research Questions

This study was designed to examine the personal accounts of these teachers, which includes their perceptions towards students with twice exceptionality.

Furthermore, this study would like to answer the following questions:
1. What are the experiences of teachers who are handling students with twice-exceptionality?
2. What are the successes of teachers who are handling students with twice exceptionality?
3. What are the challenges and issues encountered by teachers who are handling students with twice-exceptionality?
4. What recommendations could be offered for teachers handling students with twice-exceptionality?

Research Methods

The participants of this study were also briefed that they were to answer a series of questions prepared by the researcher, which was validated by experts in the field of study. These were recorded upon the agreement of the participants. Confidentiality was of high value for this study. That's why, aliases will be used instead of their real names and information about the school where they are working might be traced, therefore the researcher will not include the mention of this.

The participants were made aware through the consent letter that they will sign that their participation to this study is completely voluntary. This means that they have the right to discontinue their participation if they feel stressed or unable to continue study completion.

The researcher conducted a briefing to the participants explaining to them that their participation of this study will benefit the improvement of programs related to students with twice-exceptionality. Thus, there will be very minimal risks in their participation of the study.

Results and Discussion

The following are the experiences of teachers handling students with twice-exceptionality.

Positive Experiences :Improve as Teachers

When the respondents were asked to describe their experiences in handling students with twice-exceptionality, the responses varied. Four out of the eight teachers described their journey positively. Teacher 1, 3, 6 and 7 generally described their experiences in a positive way. Subsequently, they reflected that the experience helped them improve as teacher. Altogether, the four participants remember the experience as something that helped them improve as teachers.

The parents learned that the teachers handling their child with twice-exceptionality didn't' have any experience of doing so.

Inspiring

Another positive experience shared by the participants was how they felt inspired while handling students with twice-exceptionality. Three out of eight participants felt inspired because of the experience.

To support this, a parent also shared observable experiences with the teacher handling her child. The parent commented that she was impressed and at the same time inspired at how the teacher was able to follow her child and continue being motivated despite the many challenges called for in handling students with twice-exceptionality.

It is quite surprising to discover that there is a very limited number of studies on the intrinsic motivation of teachers in special education. There is one entitled "Teacher career motivation in special education in China" that discussed about the intrinsic motivation being the reason why teachers decided to teach in special education. Consequently, the teachers who participated in that study emphasized that it was their personal decision to teach students with special needs and that they're driven by their passion to influence their students (Yan, 2011). This is aligned to what the participants in this research shared that their positive experience of handling students with twice-exceptionality is factored by them being inspired along the process.

Challenging Experiences: Requires Effort

Seven out of eight teachers on the other hand described their experience as challenging because it required effort on the part of the teachers. Teachers 1, 2, 4, 5, 6, and 8 shared the different ways in which they had to exert extra effort to be able to meet the needs od students with twice- exceptionality.

The parent affirmed that the participants' job of handling their child with twice-exceptionality required effort. They recognized the adjustments that the teacher had to go through to be able to meet the child's needs.

Lack of Experience

Teachers 5, 6, and 7 admitted that it was really challenging for them to handle this type of learner. Aside from the fact that they did not have a background in Special Education, it was also their first time to handle this type of student as a beginning teacher. Teacher 5 confessed that didn't have any experience handling students with special needs. Teacher 6 also confessed that since she didn't have a background in Special Education, she considered the experience as personally challenging. For Teacher 7 who also considered the experience as a challenge due to lack of experience and specifically highlighted the behavioral concern that she had with the child.

Among these Successes, the first on the list is:

Identify the Strengths

Majority of the teachers in this study found it a success that they identified the strengths of students with twice-exceptionality as they experienced handling this type of learner. Six out of the eight teachers emphasized the efficient use of this. Teachers 1, 2, 3, 5, 7, and 8 shared

that found banking in the child's strengths as effective. Identifying the student's strengths included the student likes, interests, potentials, and current level.

The parent also confirmed that the teacher was successful in handling her child by using the child's strengths. The parent shared that her child felt secure with the teacher because the teacher knew strengths and knew how to manage her.

Constant Communication: Regular Meetings

Maintaining constant and open communication with students with twice-exceptionality is a tedious yet fulfilling task as this leads to successful treatment of their behavior in class. The teacher participants found it really important to communicate to their students that they care, therefore, they never hesitate to talk to them when necessary. Six out of the eight teachers emphasized the importance of constantly talking to students with twice- exceptionality.

Consistently meeting the child helps their overall performance. Additionally, the parents also observed the importance of communication through regular meetings. She shared that the meetings help their child be properly guided. And she acknowledged that it was effective.

Encouragement: Choice and Feedback

The next common theme found in the interviews with the teachers was giving of encouragement. Three out of the eight teacher participants mentioned that they found it effective and helpful based on their experiences to encourage the student with twice-exceptionality. These teachers were successful in dealing with the needs of students with twice-exceptionality because of the use of encouragement.

The parent's interview above affirmed the ways the teacher participant encouraged the student with twice-exceptionality. This proved to be an effective strategy for the child. The parent confirmed that her child felt loved because of the encouragements of the teachers.

Follow-Work: Extra Activities

Another theme that emerged and found to be a success by teachers handling students with twice-exceptionality was providing follow-up work. Four out of the eight teacher participants signified that they give and prepare extra- materials for follow-up works for students with twice-exceptionality and it was effective. In order to keep this type of learner focused and productive in school, the teachers were successful by giving them extra work.

Problems in Social/Peer Relationships

Peer Conflicts

Upon summarizing the interview results of this research, another theme emerged which delved on the social challenges of students with twice- exceptionality. Six out of the eight teachers recognized the social struggle experienced by this type of learner as they mingled with their classmates. The social challenges that these students experienced burdens the teacher in class.

Coming from the parents' statements, she admitted that her daughter found it difficult to understand people. Her child found it difficult to interact and communicate with her peers. In the end, her child often would end up working on her own and not socializing with others. This was one problem that the teacher had to solve constantly while managing the class.

Parent Communication

Communication is not only limited to talking to the child as this also involves processing the emotions of the child. Additionally, the teacher participants also highlighted the importance of communicating to the parents and Occupational therapists, as there should exist a partnership among these people who are working together for the benefit of students with twice- exceptionality. Four out of the eight participants suggested this strategy to be applied by other teachers as they found it effective from their own experiences.

Use of Montessori: Lesson Connectivity

Two out of the eight participants mentioned the use of the Montessori method as an experience that was successful as they handled students with twice-exceptionality. The researcher included this in the list, as it is among those answer that is something new and unique.

Additionally, the parent also affirmed the use of Montessori method as an effective strategy to help handle students with twice-exceptionality. The parent explained that because the method allowed students to be self-paced, it gave her daughter the opportunity to be taught lessons at her current level. Moreover, the same parent emphasized that the method allowed the school to give chances to support her daughter's learning development effectively.

Teacher' s Lack of Experience

There were three participants who shared in their responses that the challenges that they had in handling students with twice-exceptionality was mainly because they didn't have prior experience on it. Additionally, their major or background knowledge during their undergraduate is limited or has never included discussions about students with twice-exceptionality.

The statement of the parents supports this when they realize that the teacher struggled in handling their child due to lack of experience. Add to it the fact that their child is really physically active.

Conclusions

Summary of Findings

1. Teachers handling students twice-exceptionality had positive and challenging experiences along the process. The positive experiences documented that the experience of handling students with twice-exceptionality lead to their improvement as teachers. Another positive experience that the teachers shared was the realization that they discovered inspiration in teaching because they handled students with twice-exceptionality.

2. From the same group of participants, they shared that they also felt challenged when they were handling students with twice-exceptionality. The challenges that they experienced spring up from the lack of prior experience or enough knowledge about students with twice-exceptionality. There were participants who had no prior experience in handling students with twice- exceptionality and so they were challenged. Some confessed that it was a challenge because the experience requires effort on the part of the teacher.

3. Teachers handling students with twice-exceptionality shared successes from their experiences. They considered the following as successful experiences: identifying the strengths of the student, communication with the student, encouragement, giving of follow-up works, initiating communication with the parents and other specialists, and using Montessori method.

4. Moreover, teachers handling students with twice-exceptionality encountered issues and problems along their journey. These issues include social or peer relations challenge and the teacher's lack of experience in handling students with twice-exceptionality.

Conclusions

The following conclusions were made based on the findings:
1. Teachers handling students with twice-exceptionality described their experience as positive and challenging experience.
2. Teachers handling students with twice-exceptionality experienced successes as they addressed the giftedness and disabilities of their students.
3. Teachers handling students with twice-exceptionality experienced dealing with issues, and challenges to address the giftedness and disabilities of their students.
4. Teachers handling students with twice-exceptionality need training, proper assessment in handling students with twice-exceptionality, and administrative support to effectively meet the needs of these children.

Implications

1. Policies on meeting the needs of learners with special educational needs such as the Philippine Senate Bill No. 1331 have been approved and mandated. However, the literature of this study reveals that there is no particular policy intended to address the needs specifically of students with twice- exceptionality.

2. The outcome of this research also implies that the knowledge about students with twice-exceptionality is limited for those with background in Special Education. All the more this is true for teachers without any background or experience about students with twice-exceptionality. Additionally, there are very few if not no empirical studies about students with twice-exceptionality in the Philippines.

3. Teachers who handled students with twice-exceptionality weren't equipped but still they found effective strategies in meeting the needs of this type of learner from their own experiences.

Recommendations

In light of the findings and conclusions of this study, the following are recommended to the teachers who participated in this study:

1. The teachers of this study should have the proper knowledge and understanding about students with twice-exceptionality to create affirmative educational environments for this type of learner. Conducting relevant training programs or courses are strongly recommended.
2. Appropriate assessment tools like such as checklist of the characteristics that can help identify students with twice-exceptionality should be used during the diagnostic phase of instruction. Earlier identification leads to earlier and proper intervention.
3. Existing policies and laws should be revisited or enhanced to capture the needs of students with twice-exceptionality.
4. The teacher-parent partnership in handling students with twice- exceptionality did positive results in this study. Therefore, this study recommends this to be continued.
5. Future research on students with twice-exceptionality in the Philippines should be conducted to enrich the empirical data about this type of learners.

Acknowledgment

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Stakeholders' Assessment of Basic Science Programme Objectives in Southwestern-Nigeria

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Abstract

Helping to gain better understanding of the world puts science in a better position to influence positively, conditions for life on planet. Therefore, having the necessary science background and knowledge goes a long way to affect people's life positively. Hence, children are taught science early so as to develop the critical thinking skills necessary to sort through all the information that they will be bombarded with in their lives, and make intelligent decision about what to believe and how to value their world and environment. Basic science that is taught in schools has evolved as a process of gradual curriculum reform in science. This study carried out an assessment of the Stakeholders' rating of Basic Science Programme Objectives. Participants were ministry officials (33), principals of schools (89), year tutor/heads of department (166) and classroom teachers (269) selected by stratified random sampling techniques from Southwestern-Nigeria. The instrument engaged was Science Programme Objectives Rating Scale with reliability coefficient (r = 0.72). Findings shows that Stakeholders rated the objectives to be very good ($\bar{x}$ = 3.76). However, the dynamic nature of Science necessitates continual assessment of the programme objectives from time to time.

Keywords: Assessment, Basic Science, Objectives

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Introduction

Science has been described as one of the greatest weapons human has ever invented for leaping into the unknown phenomenon. It has also been described as the language of nature, without which communicating with the world, within or outside becomes impossible. A good background in Science enables people to quickly learn and understand how things around them work. Hall-Rose (2004) asserts that people need to master a minimum amount of scientific and technological knowledge to understand the world around them. Having the necessary science background and knowledge goes a long way to affect people's life positively. It is therefore pertinent, that every individual, young, old, male or female be scientifically literate in order to have a better survival. This has made the study of science and technology (which grows out of scientific discovery) indispensable to the survival of every individual on the one hand, and on the other hand an integral part of the culture of a nation, which has to be sustained, developed and passed on to incoming generations. Basic science that is taught in Nigerian schools has developed as a process of gradual curriculum reform.

The introduction of science into the Nigerian school system dated back to the time of the Christian missionaries who brought western type of education to Nigeria. The teaching of science was, however, delayed by the missionaries and the colonial administrators for obvious reasons. One of which was because the motive for colonization was essentially trade, the issue of science education could not have arisen. Another reason for non-introduction of science was the erroneous belief that Africans were inferior human beings and as such not capable of understanding science. Hence, what existed between 1895 and 1920 was the teaching of only Biology-related subjects like Physiology, Nature study and Botany in a few mission schools [Science Teachers Association of Nigeria Newsletter, 1970]. Later, General Science was taught at the Post- Primary Institutions.

According to Taiwo (1975), General Science later disintegrated to the three basic science disciplines, but General Science as a course was retained and taught to lower class as a science course for less able, the least science oriented and those who do not wish to pursue science beyond the secondary school level. Attempt was also made to teach it to higher classes but the point against it was that it was the joining of subjects that are naturally different. It was in the midst of this confusion that the euphoria of integration globally caught up with the Science Teachers Association of Nigeria (STAN), thus leading to the dramatic birth of Nigerian Integrated Science Project (NISP). This inherited confusion, along with other factors such as lack of enlightenment and trial testing, led to the erroneous belief in some quarters that Integrated Science was the old General science 'rechristened'. Nigeria then had to move with the global curriculum changes from the old Nature study and Hygiene through General Science to Integrated Science. Integrated Science then was supposed to lay foundation for subsequent science in the future.

Nigeria as part of the global deliberations on Education for All (EFA) reflected her response in the national education policies and programmes of attaining the Millennium Development Goals (MDGs) by 2015 and the critical target of the National Economic Empowerment and Development Strategies (NEEDS) decided to introduce the 9-year Basic Education programme. Basic Science and Basic Technology as teaching subjects have therefore been introduced as the science subjects to be offered at the Middle Basic and Upper Basic levels.

Federal Ministry of Education (2000) stated the specific objectives of the UBE programme to include ensuring the acquisition of the appropriate levels of literacy, numeracy, manipulative,

communicative and life skills as well as the ethical, moral and civic values needed for laying a solid foundation for lifelong learning. The National Policy on Education (FGN, 2013) entrenches the teaching of science at all levels of education. It is Ibole (2000) belief that science rules the universe. It serves and ensures human survival. Jegede (1983) also asserts that, the development in science and technology has so greatly affected the lives of every human being so much that, to be ignorant of the basic knowledge of this development is to live an empty, meaningless, and probably unrealistic life. Valley and Withier (2009) strongly believe that, a solid foundation in basic sciences is essential to free-thinking participation in the world. It is also clear that, this basic scientific preparation is essential to unlocking doors to a wide variety of professional opportunities.

Therefore, Basic Science has been chosen as one of the core subjects offered at the junior secondary school. It is taught in order to expose students to the basic workings of the scientific enterprise and also provides the learners with the necessary foundation upon which to build subsequent science learning in the senior secondary school. Basically, core curriculum is intended to provide all students with an education that will serve them well regardless of their choices after leaving school. It reinforces the teaching of basic skills and introduces an expanded range of new knowledge and skills to the curriculum. Moreso, Rutherford (2000) enunciates four properties that science course content should have: First, it should be significant; second, it should be accurate; third, it should be aligned with desired or declared learning goals and finally, it should be coherent. The science core curriculum places emphasis on understanding and using skills. Hence, the Basic Science curriculum has been designed to build into the present generation, the skills to meet present and future challenges.

Stakeholders' assessment of the objectives of the Science programme becomes inevitable, because team effort increases the chances of success in reaching educational goals. All stakeholders play important roles as part of a team working for the success of educational goals (Study.com, 2022). Therefore this study assesses Stakeholders' rating of the objectives of Basic Science Curriculum by providing answers to the following research questions:

(1) What are the profiles of the following stakeholders as indicated by the following socio-demographic variables?
   a. Ministry officials: age, gender, qualifications, area of specialization and years of service.
   b. School Principals: age, gender, qualifications, area of specialization and years of service.
   c. Year Tutors/Heads of Department: age, gender, qualifications, area of specialization and years of service.
   d. Classroom teachers: age, gender, qualifications, area of specialization and years of service.
(2) What is the extent of Stakeholders' rating of the Basic Science programme objectives?
(3) Is there significant difference in Stakeholders' Observed and Expected ratings of the Basic Science programme objectives?

Research Design

The study adopted survey research design of the ex-post facto type because the independent variables involved were not manipulated. The assessment was conducted by placing value on the programme objective.

Population

The population for the study comprises all ministry officials, Principals of schools, Year tutors/Heads of departments and teachers teaching Basic science at the Upper Basic class from the six states that comprise Southwestern Nigeria.

Sample and Sampling Procedure

A sample of Five Hundred and Fifty-seven (557) respondents was drawn using purposive and stratified sampling techniques. The procedure was by selecting ten local governments from each state comprising Southwestern Nigeria. The ten Local governments were spread among the three senatorial districts in each of the states.

Instrument

The only instrument employed in this study was Science Programme Objectives Rating Scale (SPORS). This is in two sections: Section A is on the profile of the stakeholders in terms of their age, gender, qualifications, area of specialization and years of service. Section B is a 10-item statement of objectives of Science taught at the Junior Secondary School level. This is based on the objectives of Science of the UBE programme. Stakeholders indicated their rating of the objective of science at the Junior Secondary educational level. The ratings are: 5= Excellent, 4= Very Good, 3= Good, 2= Fair, 1= Poor. The reliability coefficient for the SPORS was determined to be 0.72 (i.e., r =0.72) using Cronbach alpha.

Procedure for Data Collection

The researcher employed the services of trained research assistants from the six states that made up Southwestern geopolitical zone of Nigeria. They assisted in the administration and retrieval of the instruments lasting between two weeks.

Data Analysis

The data collected were analyzed by using descriptive statistics of frequency counts, percentage, mean and standard deviation, as well as t-test statistical analysis.

Results

The Profile of the Stakeholders in simple frequency count and percentages are discussed and followed by pie charts graphical illustrations below:

(i) Demographic distributions of the respondents by State showed Ekiti State having the highest number of respondents (100 representing 17.95%); followed by Lagos and Osun States (95 representing 17.06%); Ondo State (93 representing 16.70%); Ogun State (89 representing 15.98%) and Oyo State having the lowest number of respondents (85 representing 15.26%).
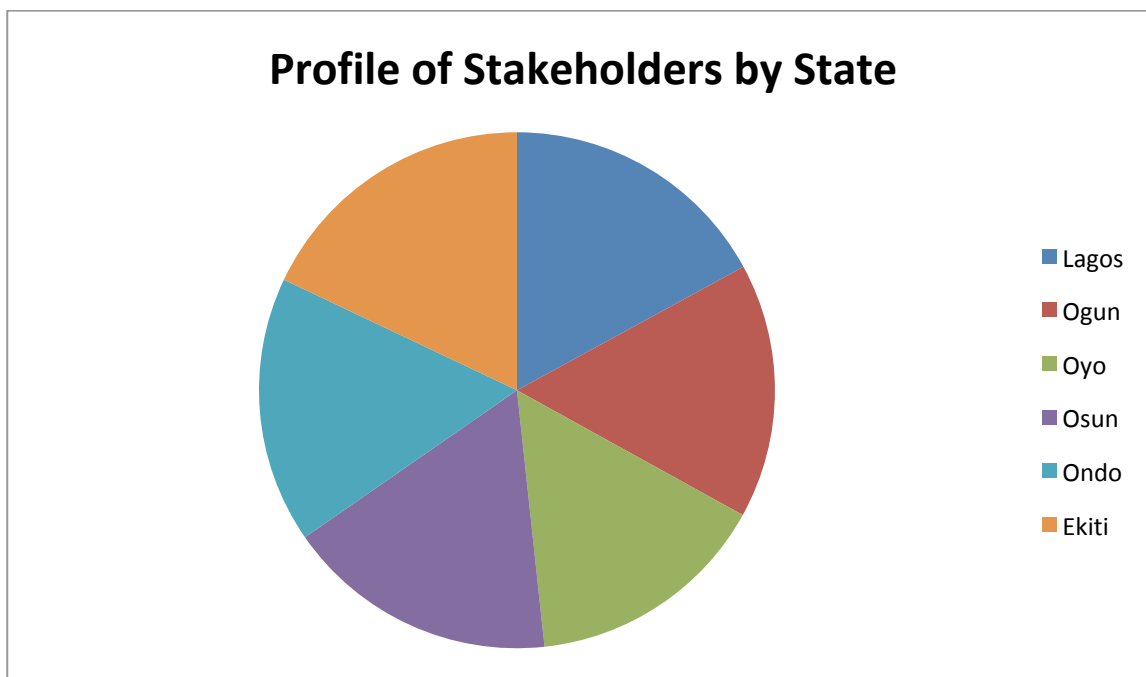
Figure 1: Profile of stakeholders by State

(ii) Demographic distributions of the respondents by Age showed 53 respondents representing 9.51% were in the age bracket 20 – 25years; 265 respondents representing 47.58% were in the age bracket 26 – 40years and 239 respondents representing 42.91% were in the age bracket 41 years and above.
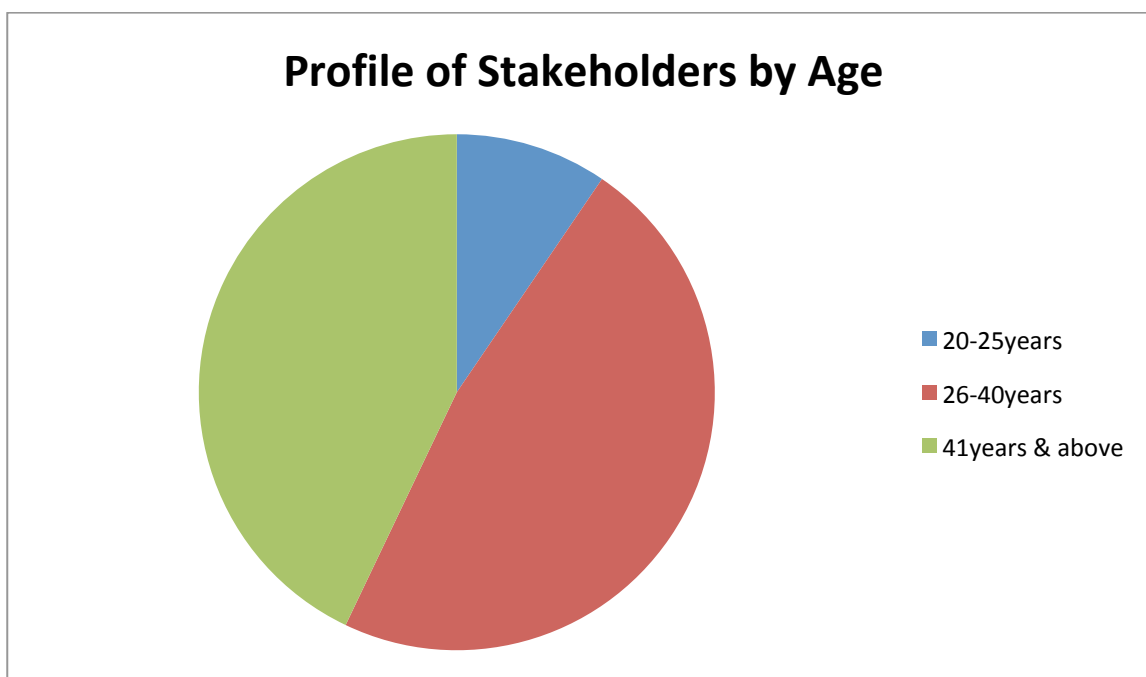
Figure 2: Profile of stakeholders by Age

(iii) Demographic distributions of the respondents by Gender showed that 269 respondents representing 48.29% were Male and 288 respondents representing 51.71% were Female.

Profile of Stakeholders by Gender
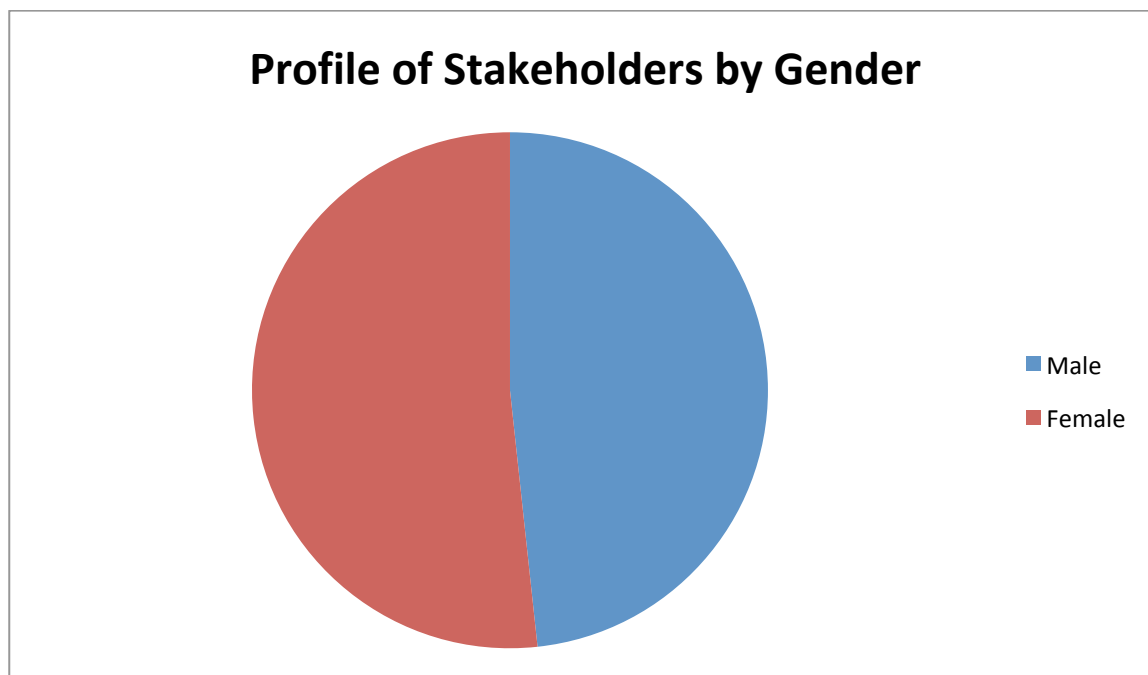
Figure 3: Profile of stakeholders by Gender

(iv) Demographic distributions of the respondents by Qualification showed 18 respondents representing 3.23% were OND/HND holders; 128 respondents representing 22.98% were NCE holders; 312 respondents representing 56.01% were First Degree holders and 99 respondents representing 17.77% were Second Degree holders.

Profile of Stakeholders by Qualification
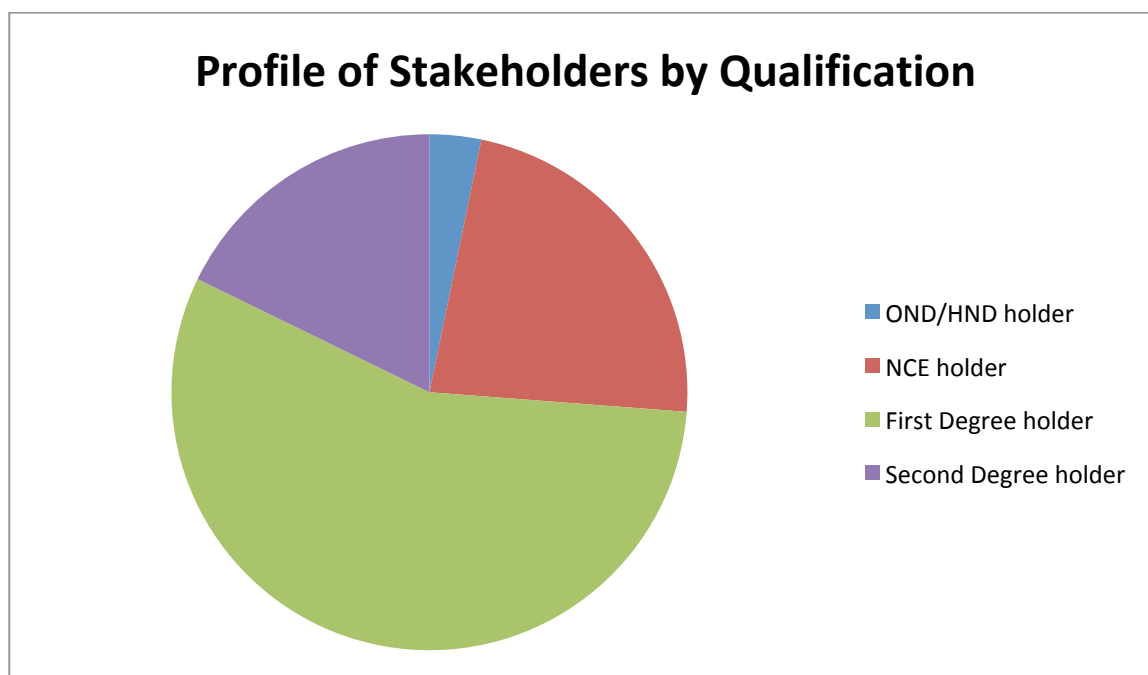
Figure 4: Profile of stakeholders by Qualification

(v) Demographic distributions of the respondents by Area of Specialization showed 278 respondents representing 49.91% specializes in Pure Sciences; 182 respondents representing 32.68% specializes in Applied Sciences and 97 respondents representing 17.41% specialize in Humanities.

Profile of Stakeholders by their Area of Specialization

- Pure Sciences
- Applied Sciences
- Humanities
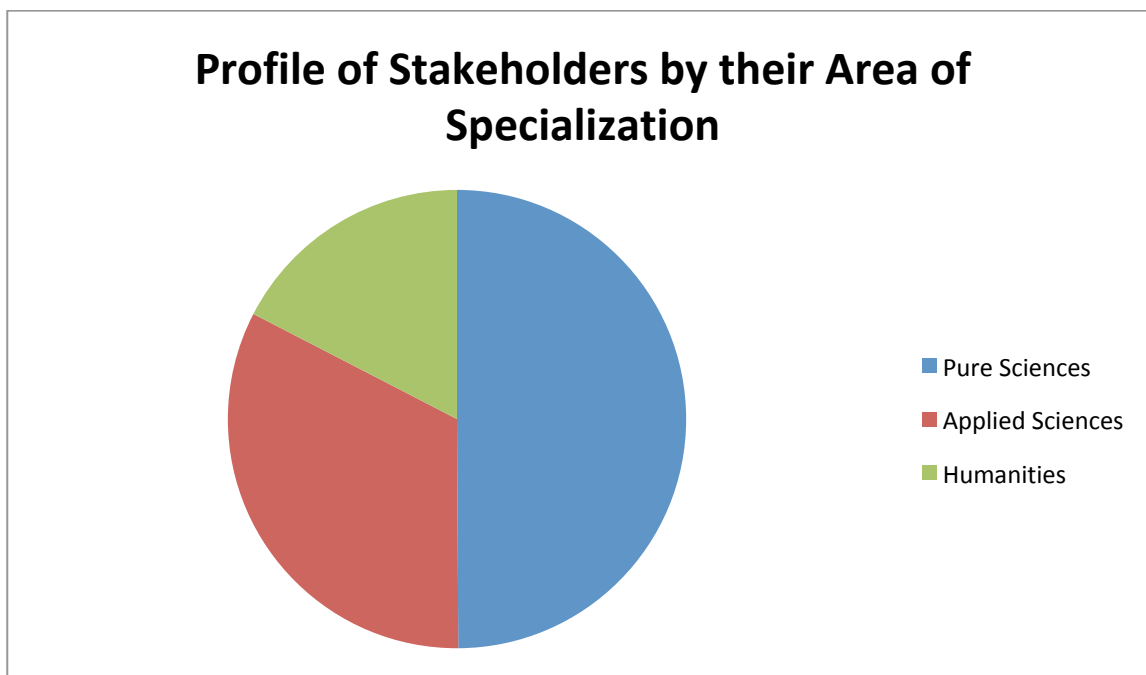
Figure 5: Profile of stakeholders by Area of Specialization

(vi) Demographic distributions of the respondents by their Years of Service showed 111 respondents representing 19.93% have put 0 – 5years in service; 115 respondents representing 20.65% have put 6 – 10years in service; 159 respondents representing 28.54% have put 11 – 20years in service and 172 respondents representing 30.88% have put 21years and above in service.

Profile of Stakeholders by their Years of Service

- 0-5years
- 6-10years
- 11-20years
- 21years & above
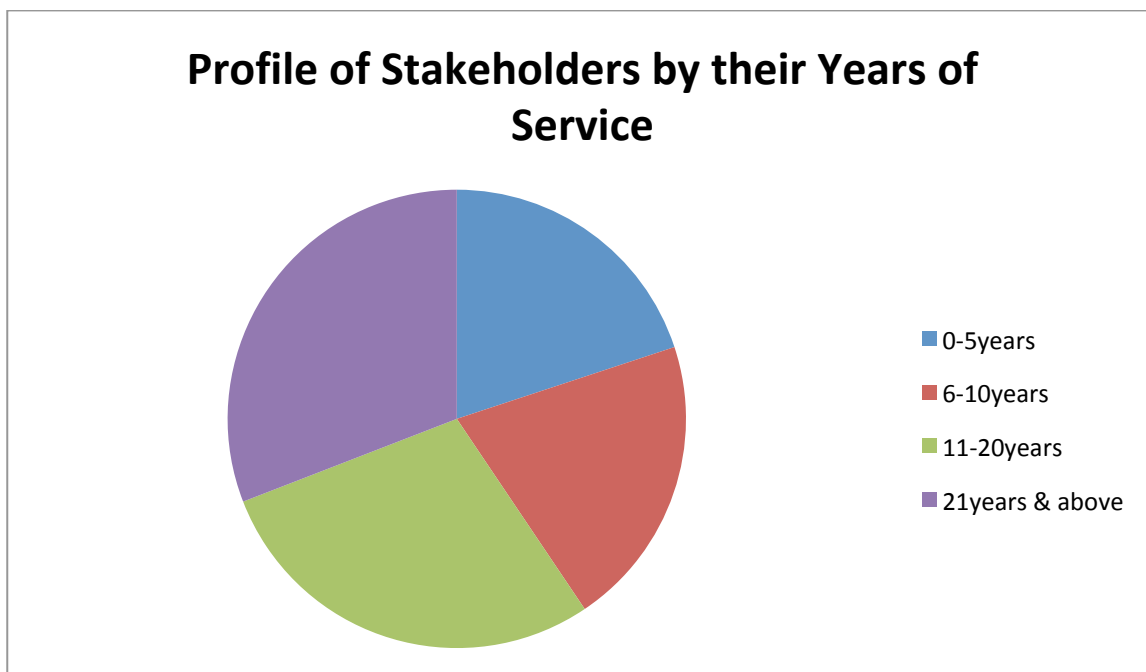
Figure 6: Profile of stakeholders by Year of Service

Research Question Two: What is the extent of Stakeholders' rating of the Basic Science programme objectives?

Table 1 below reveals the mean ratings and standard deviation of the ten statements of objectives of Basic Science by the implementers of the programme. Developing interest in Science and Technology is rated to be very good ($\bar{x}$ = 4.15). Acquiring Basic knowledge in Science and Technology is rated to be very good ($\bar{x}$ = 3.91). Acquiring Basic skills in Science and Technology is rated to be very good ($\bar{x}$ = 3.82). Applying Scientific and Technological knowledge to meet societal needs is rated to be very good ($\bar{x}$ = 3.69). Applying Scientific and Technological skills to meet societal needs is rated to be very good ($\bar{x}$ = 3.68). Taking advantage of numerous career opportunities offered by Science and Technology is rated to be very good ($\bar{x}$ = 3.71). Endowing individual with tools for learning, problem solving, analytical thinking and rational decision is rated to be very good ($\bar{x}$ = 3.54). Becoming prepared for further studies in Science and Technology is rated to be very good ($\bar{x}$ = 3.71). Recognising stages of development is rated to be very good ($\bar{x}$ = 3.61). Also, applying Basic intelligent skills is rated to be very good ($\bar{x}$ = 3.76). In all, the respondents rated the objective of Basic Science to be very good (Weighted average = 3.76), which represents the Observed Stakeholders' rating of the Basic Science programme objectives.

Furthermore, the Expected ratings of the Basic Science programme objectives revealed that for the ten items statements, 138 respondents (representing 24.78%) rated the objectives to be Excellent; 211 respondents (representing 37.88%) rated the objectives to be Very Good: 154 respondents (representing 27.65%) rated the objectives to be Good; 43 respondents (representing 7.72%) rated the objectives to be Fair and 11 respondents (representing 1.97%) rated the objectives to be Poor. In all, the objective of Basic Science was expected to be very good (Weighted average = 3.78), which represents the Expected Stakeholders' rating of the Basic Science programme objectives.

Table 1: Frequency Counts, Percentages, Mean and Standard deviation of extent of Stakeholders' Rating of the Objectives of Basic Science

ITEM	STATEMENT OF OBJECTIVES	EXCELLENT (5)	VERY GOOD (4)	GOOD (3)	FAIR (2)	POOR (1)	MEAN (X)	SD
1	Acquire basic knowledge in science and technology.	149 (26.75)	243 (43.63)	134 (24.06)	28 (5.03)	03 (0.54)	3.91	0.87
2	Acquire basic skills in science and technology.	128 (22.98)	243 (43.63)	150 (26.93)	31 (5.57)	05 (0.90)	3.82	0.88
3	Apply scientific and technological knowledge to meet societal needs.	125 (22.44)	200 (35.91)	178 (31.96)	44 (7.90)	10 (1.80)	3.69	0.97
4	Apply scientific and technological skills to meet societal needs.	125 (22.44)	205 (36.80)	164 (29.44)	48 (8.62)	15 (2.69)	3.68	1.00
5	Apply basic intelligent skills.	140 (25.13)	216 (38.78)	146 (26.21)	40 (7.18)	15 (2.69)	3.76	1.00
6	Endow individuals with tools for learning, problem solving, analytical thinking and rational decision.	111 (19.93)	187 (35.57)	166 (29.80)	75 (13.47)	18 (3.23)	3.54	1.05
7	Take advantage of numerous career opportunities offered by science and technology	130 (23.34)	203 (36.45)	165 (29.62)	49 (8.80)	10 (1.80)	3.71	0.98
8	Recognize stages of development.	92 (16.52)	227 (40.75)	178 (31.96)	46 (8.26)	14 (2.51)	3.61	0.94

9	Develop interest in science and technology	240 (43.09)	190 (34.11)	99 (17.77)	26 (4.67)	02 (0.36)	4.15	0.90
10	Become prepared for further studies in science and technology.	139 (24.96)	195 (35.01)	162 (29.08)	46 (8.26)	15 (2.69)	3.71	1.01
	Weighted average	**3.76**						

*Figures in parentheses are in percentages

Research Question Three: Is there significant difference in Stakeholders' Observed and Expected ratings of the Basic Science programme objectives?

Table 2: Summary of Paired T-test of Observed and Expected ratings of the Basic Science programme objectives

	Basic Science Objectives	N	Mean	Standard Deviation	T	Df	Sig.	Remark
Ratings	Observed	10	3.7580	0.1717	-.405	9	.695	Not significant
	Expected	10	3.7800	0.0000				

Table 2 revealed that there is no significant difference in Stakeholders' Observed and Expected ratings of the Basic Science programme objectives (t = -.405; df = 9; p > 0.05). The mean values show that Observed rating mean score (3.7580) is not significantly different from the Expected rating mean score (3.7800).

Discussion

Stakeholders in education include both those who are directly involved (such as parents, teachers, and students) and those indirectly impacted (such as government officials and local business leaders) by the success or failure of an educational system. All members of a community are stakeholders in education. Local education districts officials, Principals, Year Tutor/HOD and Classroom teachers were handsomely engaged in this study and have rated the objectives of the Basic Science to be very good.

Ivowi & Odunsi (1982) agreed that evaluation studies should focus on three important groups involved in the implementation of school curriculum. These are: teachers, who are the final executors of the programme; learners, whose mental and physical behaviours the programme intends to change; and the society, including policy maker, school administrators and parents, whose support is essential for the achievement of the programme objectives. According to Study.com (2022) team effort increases the chances of success in reaching educational goals, hence, this signals appropriateness of the objectives of the Basic Science curriculum.

Conclusion

This study focused on Ministry officials, Principals, Year Tutor/H.O.D. and Teachers rating of the Basic Science objectives. These personnels could be adjudged to have in depth knowledge and better understanding of the programme. The finding of the study shows that all stakeholders agreed that the objectives are ideal and relevant. With this rating, it can be said that government and policy makers have done their part as it relates to setting standard objective for the Basic Science curriculum of the UBE programme.

Recommendations

The following recommendations are made:
1. Government and relevant stakeholders should provide necessary infrastructures, laboratories and facilities that will motivate teaching and learning of science.
2. Government and relevant stakeholders should motivate science teachers and reward hardworking students with adequate incentives.
3. Government agencies and stakeholders should provide monitoring and evaluation in teachers impacting and students learning system to achieve the desired outcome.
4. Science teachers training and development should be continuous to keep teachers abreast of the global trend.
5. Implementers of the Universal Basic Education programme to ensure that opportunities to engage in science, both in and out of school are varied and stimulating.

Acknowledgement

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The Experience of Empathy in 10th Grade Students With the LGBTQ+ Community Through Narrative Transportation: A Qualitative Investigation

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Abstract

This research explores secondary school students' expreriences of empathy while engaging with a TV series featuring LGBTQ+ characters. The study, conducted with grade 10 students aged 15-16 in Japan, aimed to uncover perspectives through a generic qualitative inquiry. Thirty-one participants completed a reflection survey, leading to the identification of ten emergent themes related to 1) Enjoyment and Relatability, 2) Positive Impact and Learning, 3) Emotional Connection, 4) Respect for LGBTQ+ Struggles, 5) Inclusion of LGBTQ+ texts in Classroom, 6) Combatting Homophobia, 7) Applicability to Real Life, 8) Discussion Importance, 9) Changing Opinions, 10) Impact on Assumption. The investigation underscores the importance of LGBTQ+ media in education, specifically examining the impact of narrative transportation and empathy on social and cognitive aspects.

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1. Introduction

1.1 Background of the Study

The LGBTQ+ community confronts ongoing challenges globally, with discrimination, violence, and mental health issues prevalent (Parks, 2014; Nadal, 2019). Samantha Allen (2018) highlights concerning trends in the United States, suggesting a potential stalling of LGBTQ+ acceptance. The role of educators, role models, and non-LGBTQ+ allies is crucial in fostering inclusivity and combating discrimination (Day et al., 2020; Dhupa, 2016; Tiburcio & Baker, 2023). However, despite imperatives, LGBTQ+ themes often face neglect in classrooms (Batchelor et al., 2018; Bryan, 2017; Page, 2017). McPhail's (2022) research emphasizes the positive impact of LGBTQ+ literature on empathy, prompting an extension of this investigation to secondary students.

1.2 Need for the Study

This study is rooted in the significance of theory of mind and empathy in child development (Białecka-Pikul & Białek, 2021; Wellman, 2018). The relationship between narrative transportation, empathy, and theory of mind within the context of LGBTQ+ media is explored, aiming for a comprehensive understanding of these psychological constructs.

1.3 Purpose of the Study

The study explores secondary students' experiences with a LGBTQ+ TV series, particularly the show "Heartstopper," through the lens of narrative transportation theory. Building on McPhail's (2022) research on empathy while reading LGBTQ+ texts, this investigation aims to contribute insights into the empathetic experiences of secondary students.

1.4 Research Question

- What is the experience of empathy in secondary students when watching a TV series focused on LGBTQ+ characters and themes?
- How can LGBTQ+ texts be effectively implemented in secondary classrooms?

2. Literature Review

2.1 Narrative Transportation

Narrative transportation theory (Gerrig, 1993) conceptualizes the detachment from the reader's world into the narrative world, focusing on narratives, vicarious experiences, emotions, enjoyment, and potential persuasion (Green, 2021; Van Laer et al., 2019). This study explores the empathetic experiences of participants by qualitatively examining the connection and identification with characters during the viewing of "Heartstopper."

2.2 Empathy

Empathy, defined as the ability to understand others' thoughts and feelings, plays a vital role in this study (Flournoy et al., 2016). The investigation adopts a broad definition of empathy, encompassing the understanding and sharing of others' emotions (Baron-Cohen, 2011; Flournoy et al., 2016).

2.3 LGBTQ+ TV Shows in the Classroom

Mainstream media's integration of LGBTQ+ themes, including shows like "Glee," "Modern Family," and "Heartstopper," is noted (Kies, 2016). "Heartstopper" is particularly recognized for its portrayal of diverse queer identities and challenges within the LGBTQ+ spectrum, justifying its selection as the study's focus (Trivette, 2022).

The study addresses the use of TV series, as authentic materials, in English as a Foreign Language classrooms (Rivas, 2021). While existing research acknowledges the positive impact of LGBTQ+ media, a research gap remains concerning the empathic experiences of secondary students engaging with such content.

3. Research Design

This generic qualitative study employed surveys to collect data from 31 grade 10 participants after watching "Heartstopper." The research aligns with generic qualitative inquiry principles (Percy et al., 2015). The data analysis utilized inductive and thematic analysis, grouping anonymous survey responses into ten identified themes.

4. Target Population and Sample

The target population comprised grade 10 students in an English Language Acquisition classroom, aged 15-16 in Japan. Participants self-reported gender and sexuality, and there were heterosexual, cisgender, bisexual, and transgender students. Inclusion criteria specified enrollment in the English Language Acquisition class, while exclusion criteria excluded students from other classes or schools.

5. Procedures

Participants were recruited from the grade 10 classes taught by Shawnee McPhail and Alison Ozawa, with the option to participate provided to all students. Informed consent, voluntary participation, and anonymity were emphasized. Demographic questions were optional, and participants were assured of no rewards, punishments, benefits, or hindrances tied to their responses.

6. Protection of Participants

Participants were informed about the voluntary nature of their involvement through consent forms in Japanese and English. Anonymity was maintained through alphanumeric codes, and data confidentiality was assured. The principal's consent was obtained, and data will be kept confidentially for seven years before destruction.

7. Data Collection

Surveys were administered via Google Form, collecting reflections from participants after watching the TV series. The reflection was unrelated to grades or the unit, ensuring an authentic expression of experiences. Data anonymization followed participant consent.

8. Data Analysis

Thematic analysis was employed to categorize survey responses into emergent themes. A qualitative approach allowed for rich insights into participants' perspectives. The analysis combined inductive methods, capturing recurring words and themes to form a comprehensive interpretation.

9. Presentation of Data and Results

Ten themes emerged from the survey responses, categorizing participants' experiences: 1) Enjoyment and Relatability, 2) Positive Impact and Learning, 3) Emotional Connection, 4) Respect for LGBTQ+ Struggles, 5) Inclusion of LGBTQ+ texts in Classroom, 6) Combatting Homophobia, 7) Applicability to Real Life, 8) Discussion Importance, 9) Changing Opinions, 10) Impact on Assumption.

Enjoyment and Relatability

Participants consistently expressed enjoyment, attributing it to the relatability of LGBTQ+ experiences portrayed in the show. Participant 7 highlighted, "I had fun watching the show because it was easy for me to understand how they feel about themselves and what they are struggling with." Similarly, Participant 15 noted, "I enjoyed watching a show with LGBTQ+ characters and themes because I was in a similar situation with characters who appear in the show."

Positive Impact and Learning

The positive influence of the show on participants was evident, leading to increased awareness and understanding of LGBTQ+ issues. Participant 31 emphasized, "I knew about LGBTQ but watching this was a huge influence on me, and I was able to learn many things." Learning about the struggles faced by the LGBTQ+ community prompted a shift in perspectives, as articulated by Participant 21: "It felt like watching a normal school drama without feeling strange. I thought I might be annoyed, but I didn't feel anything and rather it was really good relationship and I need to emulate."

Emotional Connection

Emotional connection emerged as a recurring theme, with participants expressing strong feelings toward the characters. Participant 12 stated, "I think watching LGBTQ+ has a big impact on us. I was moved by the way the characters live their lives while valuing relationships with other people despite being LGBTQ." Key scenes evoked strong emotions, fostering a deeper connection. Participant 18 shared, "When there were flashbacks to how Ben treated Charlie, I felt strong things and wanted to help him. I understood his pain."

Respect for LGBTQ+ Struggles

Participants underscored the importance of respecting the struggles faced by the LGBTQ+ community. Participant 8 expressed, "It is hard to come out because some people will not feel good, and I think it is okay to have those feelings, but people need to understand LGBTQ+ even if they do not agree." Participant 28 echoed this sentiment, stating, "I think there are many people like Ben and Harry who think negative things about LGBTQ+ people. I think

they can have those opinions, but they should not say it because it hurts people." The show played a pivotal role in fostering empathy and respect for diverse identities.

Inclusion of LGBTQ+ Texts in Education

A significant theme revolved around the incorporation of LGBTQ+ texts in the classroom. Participant 10 emphasized, "I thought learning about LGBTQ+ as a unit is good for education." Participant 11 elaborated, stating, "I enjoyed watching the Heartstopper because every year we learn some SDGs and we search about gender, but I didn't watch real drama so I was interested and want to learn and understand real life." Participants advocated for LGBTQ+ education to promote understanding, support, and diverse perspectives.

Combatting Homophobia

The show was perceived as a tool to combat homophobia, especially in regions less familiar with LGBTQ+ topics. Participant 1 shared their cultural experience in Japan, stating, "In Japan, we don't have these kinds of shows much because LGBTQ+ is not that familiar than western countries. I genuinely felt it was a really good show, and people in Japan should watch this show and notice the problems in LGBTQ+ communities." Participants highlighted the show's potential to challenge discriminatory attitudes and promote societal tolerance.

Applicability to Real Life

Participants found the show applicable to their lives, either through personal experiences or gaining insights into the lives of others. Participant 29 said, "I have a friend who is transgender, and I learned more about them from this show." The perceived realism of the show contributed to a sense of connection and relevance, even for students who did not identify with the characters or themes directly.

Discussion Important

Discussions surrounding the show were deemed essential by participants. Engaging in conversations about characters' feelings and different situations allowed for diverse perspectives and enriched the viewing experience. Participant 29 highlighted, "I enjoyed the discussion, thinking of emotions in each character's various situations. This time, I had a discussion with 3 people and I knew that people each have their own value for love, so I got some new different ideas from those people. It was a very significant discussion."

Changing Opinions

The show played a role in altering participants' opinions about the LGBTQ+ community. Participant 9 shared that their preconceived notions were challenged: "I had an image that transgender people were people who had been abused and would abuse other people. By watching this show, I realized that my understanding of trans people was not correct." Preconceived notions and biases were challenged, leading to a more informed and empathetic understanding of diverse sexual orientations and gender identities.

Impact on Assumptions

Participants acknowledged that the show influenced their assumptions about LGBTQ+ individuals. Participant 21 shared, "I learned coming out is very scary and that you cannot tell by looking at someone if they are LGBTQ+." Participant 12 echoed this sentiment, saying, "I learned we have to change the assumptions we make about other people." Learning not to make assumptions and understanding the complexity of coming out were highlighted as key takeaways from the viewing experience.

The identified themes underscore the multifaceted impact of the show on viewers, promoting understanding, empathy, and positive societal change. The participants' diverse experiences collectively contributed to a positive and rich empathetic engagement with the LGBTQ+ TV series.

10. Conclusion

This study contributes valuable insights into the empathetic experiences of secondary students engaging with LGBTQ+ literature and TV series, shedding light on the potential positive impact of such content in educational settings. The findings offer implications for the effective incorporation of LGBTQ+ texts in classrooms, emphasizing the significance of narrative transportation and empathy in the educational context.

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A Study on Mathematical Anxiety, Mathematical Resilience of Phra Dabos Students and a Survey for Improving Mathematical Learning Management Plan

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Abstract

The purpose of this research is to study the mathematical anxiety and mathematical resilience of 45th class Phra Dabos students and design the network diagram for the revision of the subject of mathematics for industrial technicians by using the data obtained from the stakeholders' requirement to improve the teaching process, time management and learners' potential in knowledge application. The population of this research is 78 students and 2 volunteers of Phra Dabos. The experiment began with collecting the opinions of the students which is divided into 2 phases, phase 1: data collection through mathematical anxiety and mathematical resilience questionnaire, phase 2: data collection through the interview of the students from 8 majors, 2 per major, 16 in total. The questions involved the learning management in the past year and suggestions for the improvements of the learning activities of the volunteers. Followed by the design of a network diagram compiled from the obtained data. The diagram was then thoroughly discussed among the volunteers. The data from the questionnaires was analyzed using descriptive statistics, including mean, standard deviation, percentage, and data analysis. It was found that the overall mathematical anxiety of the 45th class Phra Dabos students was moderate. Likewise, the overall mathematical resilience was also medium. Lastly, the guidelines for improving learning management in the next academic year were obtained and presented in the network diagram. Furthermore, the substance linkage between mathematical anxiety and mathematical resilience was found.

Keywords: Mathematical Anxiety, Mathematical Resilience, Stakeholders' Requirement

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Introduction

1. Theoretical Background

One of the main purposes of education is to prepare students to be lifelong learners and could adapt to their ever-changing surroundings. This is also true in Thailand, where its education system still has been struggling for several decades to achieve what we mentioned. As it focuses only on contents and memorization without proper integration of questioning techniques or thought processes, Thai adolescents and the workforce's vast potential remains to lie in wait for improvement. Some Thai students might be able to improve themselves past the point where their education system is at and attain the necessary competencies for thriving in modern society, while many students are left out of the usual formal education due to the lack of opportunities. This would greatly increase the number of vulnerable groups that are prone to drugs, violence, and misconduct instead of capable workforces that would drive the economy.

Non–formal education is sought after by many students who have limited resources and access to formal education as it provides a variety of competencies for those who aim to directly apply for jobs rather than higher education or college certificatese (Shabaya, 2022). This is aligned with the principle of Phra Dabos school, "Thrive and strive without certificate," which aims to provide the needed vocational competencies for those who are left out of formal education and in need of opportunities. Regardless of the students' background, the school indiscriminately offers a one – year vocational course that consisted of eight majors namely, carpenter, welder, electrician, electrotechnician, constructionist, repairman, mechanic and machine tool technician. The curriculum includes two aspects that would be sufficient for their designated occupations: basic theory for a career that involves technician skills and real–world practice where the classes are organized by the institute and volunteered teacher.

The good intentions to provide the necessary competencies from the institute could not be more apparent, but as the students usually detest the theory part, the content would often be crammed and taught in the manner of brief but aggressive lecture without proper approach as shown in Figure 1 below.
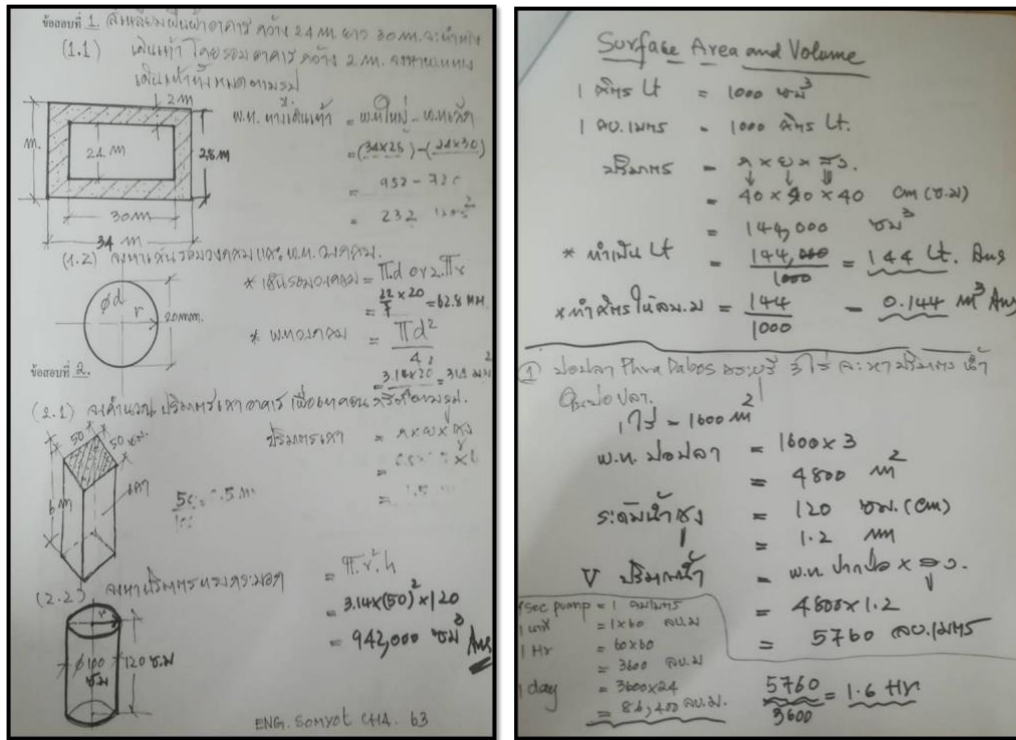
Figure 1: Phra Dabos lectures

And to those who are left behind by the current education system, this would not be ideal. It also proved to be not effective in tackling with the students' mathematical anxiety which was clearly shown during the period of our observation in the subject of mathematic for industrial technician.

Mathematical anxiety is defined as the feeling and anxiety that hinder the mathematical process to solve mathematical problems whether in the context of real world or education (Centre for Neuroscience in Education, 2023). As we interacted with the students, many had shown several indicators of mathematical anxiety, ranging from not being able to explain the answer to the questions that they recently solved to feigning ignorance during the class because there is a chance of being humiliated from the feeling of answering the questions wrong. The problematic situations did not elevate, but it tended to impede the thought process needed for their future professions.

The key to reduce their mathematical anxiety might be lying dormant with the aspects of mathematical resilience as it was stated that teaching the students to be resilient in real life is crucial as they would bounce back from the devastating situation in their life (Casinillo, 2022). Likewise, mathematical resilience is the right dose to the poisonous mathematical anxiety since it would teach the students how to handle the anxious feeling that hinder the mathematical process.

The term mathematical resilience is understood as the confidence, effort and perseverance which support an individual to go through the mathematical process and arrive at the desired outcome (Lee and Ward – Penny, 2022). As we can see, if it is implemented into the curriculum, the students would greatly benefit from it, and it would also be a great help to the school if the process of revising the subject is compiled into a diagram for further autonomous practice of the curriculum.

Hence, the purpose of this research is to study the mathematical anxiety and mathematical resilience of the 45th class Phra Dabos students and design the network diagram for the revision of the subject of mathematics for industrial technicians.

2. Implementation and Results

The experiment is conducted at Phra Dabos school, Samut Prakan with the population of 78 students of class 45 at the institute and 2 volunteer teachers. The experiment was in the manner of data collection through questionnaires and interviews, and divided into three sections namely, the students' opinions, network diagram design and volunteer teachers' opinions. The first section consisted of two phases, phase 1: data collection through 10 – item mathematical anxiety questionnaire and mathematical resilience scale of 23 items, phase 2: data collection through the interview of the students from 8 majors, 2 per major, 16 in total. The questions involved the learning management in the past year and suggestions for the improvements of the learning activities of the volunteers. The second section would focus on constructing the method from the obtained data from the first section to revise the subject and present it as a diagram. The last section would focus on discussion with the volunteer teacher with the results obtained from the prior sections to make an agreement upon the revised teaching approach.

The Students' Opinions

Phase 1: The Results of the Questionnaires

As the mathematical resilience and anxiety of the class 45 Phra Dabos students are within our concern, we had deployed the questionnaires (Johnston-Wilder, 2014) of both variables for data collection.

Table 1: The results of mathematical resilience and mathematical anxiety questionnaires

	Mean ($\bar{X}$)	S.D.	Interpretation
Mathematical Resilience	76.79	7.92	Medium
- Value	28.79	4.40	High
- Struggle	27.95	3.35	High
- Growth	20.05	3.25	Medium
Mathematical Anxiety	26.10	4.20	Medium

The data obtained showed that students' mathematical resilience was on the medium level while its aspects, namely, value, struggle, and growth, were on a high, high, and medium levels, respectively. It was shown that while mathematical resilience was of substance, mathematical anxiety was also on the level that might impact the development of positive attitude and achievement toward mathematics. The level of both variables also sparked the question whether there is any significant relation between them. Though concluding that there is any relation between the variables would require further investigation and study, we would like to see if there is any lead toward what we suspect. Thus, linear-regression where both variables were used as independent and dependent variable was conducted, and the results are shown in the figures below.
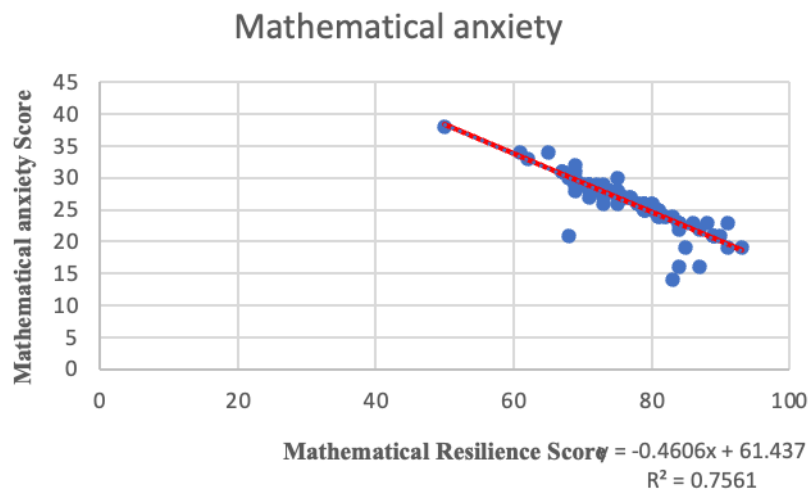
Figure 2: The linear-regression of mathematical anxiety
using mathematical resilience as the independent variable
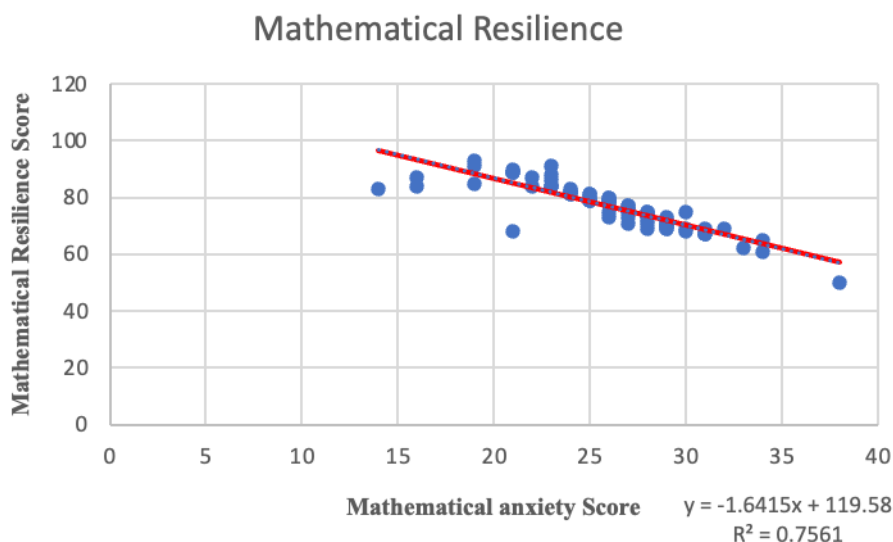
Figure 3: The linear-regression of mathematical resilience using
mathematical anxiety as the independent variable

Table 2: The significance level of the linear regression between
mathematical anxiety and mathematical resilience

	Mean	S.D.	Multiple R	R Square	Sig.
Mathematical anxiety Score	26.1	4.20			
Mathematical Resilience Score	76.79	7.92	0.87	0.76	$5.404e^{-25}$

The results from the regression had shown that both variables could, in a sense, explain each other to a certain degree since the R^2 of the regression is equal to 0.76 and the significance level is less than 0.05. This proved that there might be a worthy lead for further investigation

of the relation between the two variables. Hence, we would subject this as one of the main objectives of our next study.

Phase 2: The Interview

According to the interview, many students had told us that they understand that mathematics is important and would be used in many parts of their lives, but as they proceed in the class regardless of any context or formality, they are usually faced with unknown symbols, rushed lectures and very hard problems. And along the way, they might get humiliated for doing something wrong in the class, hence, they would avoid interacting with teachers during the class and remain silent when vital questions emerge. Some even believed that they would not get any better at mathematics and only the chosen few would excel at learning it.

The content should be consistent with what they were practicing, but it should not be crammed and thought aggressively. They would prefer an organized and comprehensive class if possible. Moreover, teaching mathematics in theory seemed to not intrigue them very well as they demand mathematics in the sense of application as they view it as a more necessary skill.

Thus, presenting them with real – world mathematic problems would be ideal in teaching them the basic theory. Some excerpts from the interview are shown below:

> "Learning mathematics is not for me, I mean it is only who has innate talent."

> "I don't really like the theory part as I want to be a technician. I think practice and application are more important."

> "We would not usually use the content to its fullest, hands – on activity may suit us more."

> "Answering mathematical questions make me really nervous. I usually forget what is on my mind when I am about to answer them."

According to the interview and the results in Table 1, we would say that the students rather had fixed mindset and anxiety in studying mathematics and solving this problem should be of haste by using the approach that would encourage them to see the value of learning process and foster mathematical resilience (Johnston-Wilder et al, 2021).

Network Diagram Design

As we collect the data from the students and curriculum, we present the new outline of the subject as a network diagram below.
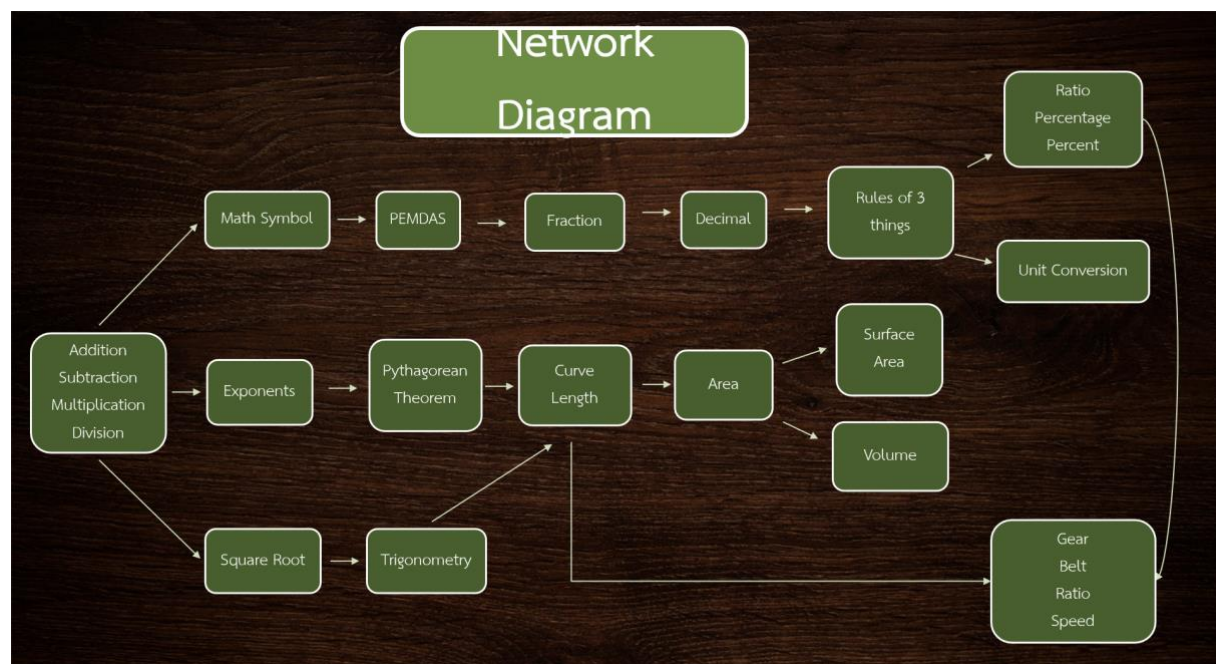
Figure 4: The network diagram of the revised subject

The network diagram presents on how we would redesign the subject to be more consistent with their practice. Furthermore, we decided to compose the necessary linkage and connection between each topic for seamless implementation and recollection as shown in the above figure.

The Volunteer Teachers' Opinions

As we presented and discussed the revised subject and students' opinions with the other volunteer teachers, we had arrived at the three crucial points to enhance the teaching approach, which are presented below:

1. Interactive learning: Implementing interactive learning methodologies would keep students engaged and foster a deep understanding of mathematical concepts.
2. Practical application: Integrating real-world examples and practical applications of mathematics would help students see the relevance of the subject in their future careers.
3. Collaborative learning: Promoting group projects and collaborative learning environments would develop teamwork skills and encourage peer-to-peer knowledge sharing.

We also agreed upon the use of problem – based learning to cover the three key points above and as the main approach in teaching the course in the next academic year since presenting the students with the approach that focuses more on real – world problems, self – learning and the process of learning would help quell the mathematical anxiety and promote mathematical resilience (Ariyanto et al., 2019; Johnston-Wilder et al, 2021).

Conclusions

In conclusion, this research on mathematical anxiety and resilience among Phra Dabos students offers valuable insights into enhancing the teaching process for the subject of mathematics for industrial technicians. By implementing problem–based learning, students

will have the opportunity to overcome anxiety, develop resilience, and apply their knowledge effectively. The next academic year will witness an even more engaging and impactful mathematics learning experience.

The study also suggests that there might be a linkage between mathematical anxiety and mathematical resilience, which will be explored in our next study. We also aim to promote the students to have a growth mindset for the better development of mathematical resilience, create engaging material to improve learning motivation and focus on mathematical connection to promote the application of mathematics in the real world.

Acknowledgements

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India's Digital Divide and Kerala's 'First Bell':
A Radical & Alternative Form of Digital Education During COVID-19

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Abstract

Education suffered one of the biggest blows due to Covid-19 in 2020-22. As educational institutes moved to digital-online teaching and learning, 'digital divide' or the unequal access of the internet and other digital tools among students, turned out to be a major impediment in its proper conduct & success. In India, caste, class and gender barriers are major contributors to the digital divide, and with the pandemic, this also caused an increased chasm between those who could afford to learn despite difficulties and those who couldn't. This led to widespread discontent and protests by students of various ages across India, raising demands to reopen educational institutes, to provide students with free internet and other digital requirements etc. However, a small state in India's southern end called Kerala came up with an innovative and reformative form of pedagogy in the same period, that stressed on egalitarianism and justice. For a state with high television penetration, the Left-wing state government's well-structured 'First Bell' programme proved useful for students from all backgrounds, and when compared to other Indian states, was able to bridge the digital gap to a great extent. It democratised digital education by making the lessons not only available via the internet but on the government's TV channel too, and secondly, it provided and campaigned to provide students with free laptops, TVs and other gadgets required for e-learning. This paper is on 'First Bell' as a radical and alternative form of digital-online education, with an investigation of its methods and results.

Keywords: Kerala, Covid-19, E-Learning, Education, First Bell, Left-Wing, Digital Divide, Egalitarianism

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Introduction

This article delves into Kerala's distinctive approach amidst the landscape of Indian states in democratising e-learning and online education, particularly focusing on its initiative, the state government-run 'First Bell' lessons. It examines how Kerala pioneered efforts to ensure accessibility, especially for marginalised students through this initiative, which, unlike in any other Indian states, utilised government-led online classes to address the 'digital divide' exacerbated by the pandemic. It emphasises Kerala's historical commitment to education and literacy, showcasing 'First Bell' as a significant milestone in the society's pursuit of egalitarian principles. Furthermore, it examines how the central government failed in ensuring adequate infrastructure for education across the nation, contrasting this with Kerala's pioneering efforts to bridge the digital gap. This exploration is thus framed within two broader contexts: (1) the onset of the pandemic in India, magnifying the digital divide across states, and (2) Kerala's unique response to Covid-19, diverging from approaches adopted by other states.

The study draws upon various sources, including reports, surveys from international and national agencies, social media posts by Kerala's government representatives, newspaper articles, and secondary literature. Remarkably, despite its significant implications, there remains a dearth of academic research on Kerala's strategies in addressing the digital divide.

The key arguments that this essay aims to present are: (1) First Bell stands as a singular experiment unparalleled in other Indian states; (2) its tangible outcomes significantly mitigated Kerala's digital divide, setting it apart from struggling states; and (3) these efforts should not be viewed in isolation but rather as a continuum of Kerala's long-standing commitment to literacy, post-literacy, and education since the 1990s, emphasising democratic and egalitarian principles.

The first section delves into the multifaceted impact of Covid-19 on India, examining not only its epidemiological ramifications but also the socio-economic and political reverberations experienced across the nation. The second section scrutinises the stark disparities exacerbated by the pandemic, drawing on comprehensive surveys by international and national organisations. Section 3 discusses the spread of the pandemic in Kerala and how the state dealt with it in the context of previous calamities that hit the state, as well as provides a brief introduction to the state Department of General Education's use of digital tools. Section 4 delves deeper into 'First Bell' and the participation and support offered by Kerala's civil society for it, underscoring its commitment to inclusive education and adaptive crisis management. Section 5 explores the challenges encountered by 'First Bell' and Section 6 investigates the results of 'First Bell'.

Ultimately, it calls for a comprehensive study of Kerala's digital initiatives, recognising their transformative potential in revolutionising access to education and narrowing educational disparities on a larger scale.

Covid-19 in India

India, positioned in the Global South, faced devastating repercussions from the SARS-CoV-2 outbreak, witnessing the spread of successive variants—Omicron and its sub-variant, Eris, in 2023. The nation endured three waves of the pandemic, recording 45,001,384 confirmed cases and 533,294 fatalities, amounting to a 1.19 per cent fatality rate (WHO website, 2023).

The initial case emerged on January 30, 2020, triggering the first wave from March to October 2020, followed by subsequent waves from April 2021 to July 2021 and December 2021 to January 2022 (MyGov website, 2023). India initiated its vaccination program on January 16, 2021, administering approximately 1.7 billion doses, including first, second, and booster doses, to over 720 million individuals. Covishield, Covaxin, Sputnik V, and Moderna constituted the approved vaccines in India (Mukim, et.al., 2022).

The central government faced severe public scrutiny concerning its pandemic response and policies. The ruling Bhartiya Janata Party (BJP henceforth) drew criticism (Al Jazeera, 2021) for neglecting the welfare of marginalised communities (Ebrahim, 2022), especially the mishandling the displacement of migrant labourers (Koppikkar, 2020; Sirimane & Thapliyal, 2020), propagating unscientific and religious measures (Indian Express, 2021; Padma 2021), sluggish response (Frayer, 2021), curbing freedom of expression, etc (Imran & Javed, 2023; Radhakrishnan & Thaliyil, 2021). The pandemic's impact reverberated across economic sectors, plummeting India's Gross Domestic Product (or GDP) to 3.1 per cent in the 2020 fiscal year's fourth quarter. Business sectors witnessed a 53 per cent impact, unemployment surged by 19 per cent, and the tourism industry incurred a staggering loss of around Rs. 15,000 crores. Multiple sectors, including service, oil & gas, pharmaceuticals, telecom, automobiles (Nayak, et.al., 2022), real estate & construction (India Today, 2021), transport (Gomathi, et.al., 2021), food & agriculture (Rathore, 2023), suffered severe setbacks, as documented in various studies and news reports.

Reports from various organisations shed light on the dire educational situation during lockdowns. Diverse approaches to the pandemic emerged among Indian states despite centralised regulations on lockdowns and restrictions. Instances of protests surfaced across regions and sectors. For instance, in Karnataka, frontline workers rallied for a fixed monthly wage (Chhabra, 2020), while in states like Chhattisgarh (Tiwari, 2021), and New Delhi (Jha, 2021), both school and university students and teachers protested the blended and online education modes (Kaushal, 2021). Concerns over the digital divide were echoed by students' and teachers' organisations, condemning the shift to online examinations, emphasising the risks of excluding those lacking internet access. The gendered aspect of the digital gap, shedding light on the additional responsibilities faced by girl students, including household chores and potential exposure to abusive environments within their homes, has also been underscored by studies and protests (Mathrani, et.al., 2020).

Digital Divide

India stands as the world's most populous nation with 1.43 billion inhabitants and boasts one of the largest education systems globally, comprising 250 million students across 1.5 million schools and 37.4 million enrolled in 50,000 Higher Educational Institutions (India Today, 2020). However, the abrupt shift to online education amid the pandemic overlooked the nation's vast digital disparity. This oversight disproportionately affected marginalised groups such as the Scheduled Castes, Scheduled Tribes, Other Backward Castes (OBCs) which includes Muslims, girls, and rural students, resulting in their exclusion from continued education (Oxfam India, 2022). Multiple surveys conducted by international and national agencies, including Oxfam India, UNESCO, UNICEF, Azim Premji Foundation, the National Council of Educational Research and Training (NCERT henceforth), the People's Archive of Rural India (PARI henceforth) ICRIER & LIRNEAsia, and the central government's Economic Survey 2021-22, corroborate these findings.

Oxfam India highlighted that over 80 per cent of students in government schools across Eastern and Northern Indian states like Odisha, Bihar, Jharkhand, Chhattisgarh, and Uttar Pradesh did not receive educational materials. UNICEF's study revealed that approximately 67 per cent of parents felt their children's overall skill development lagged due to limited access to digital devices and e-learning tools.

Surveys documented by organisations like PARI indicated the absence of support from government schools and local authorities, resulting in students' discontinuation of studies in Northeastern, Eastern and North Indian states such as Assam, Bihar, Jharkhand, and Uttar Pradesh. The UNESCO report following the pandemic emphasised the widespread perception among respondents that students were falling behind, not just academically but also in social skills, fitness, and future job prospects.

The NCERT survey in 2020 unveiled significant challenges: 27 per cent of Indian school students lacked smartphones or laptops, 2.28 per cent faced hindrances due to frequent power outages, and 3.33 per cent struggled to concentrate during online classes. Moreover, these classes could not effectively address issues in subjects like Mathematics and Science, while 50 per cent of students lacked essential school textbooks. Another survey by the Azim Premji Foundation in 2021 revealed that nearly 60 per cent of Indian school children were unable to access online learning.

Data from the survey conducted by ICRIER & LIRNEAsia in 2021 indicated that only 20 per cent of Indian school children had access to remote education during the pandemic. Alarmingly, 38 per cent of households reported at least one child dropping out due to these challenges. Additionally, the Economic Survey 2021-22 noted a decline in rural children's enrolment (ages 6-14) in schools, highlighting the profound impact of the pandemic on education accessibility.

Covid-19 in Kerala

Kerala was where the first Covid-19 positive case was detected in India – a student of medicine who had just returned home to Kerala's Thrissur district from Wuhan, China – on January 30th, 2020 (Andrews, et.al., 2020). Importantly, the pandemic had arrived in a state which was still recovering from calamities like the Ockhi cyclone (KSDMA website) in 2017 which caused massive infrastructural damage, killed 75 people, and left 208 missing, an outbreak of the Nipah virus in 2018 which led to 17 deaths and 18 confirmed cases (WHO website), and two devastating state-wide floods in 2018 (NIDM, 2020) and 2019 (NRSC, 2019). As far as Covid-19 is concerned, Kerala recorded 65,34,352 cases and 68,197 deaths in total as of April 2022 (Govt of Kerala Dashboard website). The state government received a lot of praise for their handling of the spread of the virus at various stages (Roy & Babu, 2020; Vora, 2020) and was also criticised when it went wrong. However, Kerala's proactive crisis management – testing, contract tracing and communication -- has been considered by experts, policymakers, and surveys as the best when taken in consideration along with the condition in other states (WHO website; Menon, et.al., 2020). Democracy and rationalism have been the axes around which Kerala's response to the pandemic was formulated (Chathukulam & Tharamangalam, 2021). Kerala's robust primary healthcare system was lauded for having laid the foundation for the state's ability to deal with such unprecedented crises – visible in both Nipah and Covid outbreaks (Covid-19 Management, 2022). Along with this, decentralisation and public participation, the use of media by government

representatives for regular communication etc have also been considered exemplary contributors (Ajayakumar, 2020).

Kerala's tryst with literacy and education has been one of the most successful and long-standing models in the country. As per India's Ministry of Education in 2023, Kerala is the most literate state in India, with a literacy rate of 94 per cent, often rounded off as 'total' or '100 per cent literacy', followed by Lakshadweep at 91.85 per cent and Mizoram at 91.33 per cent (India Today, 2023). This is not a new development. Kerala began its literacy campaigns in the form of a coordinated, state-wide mass movement post the Indian independence, which was then followed by post literacy campaigns (Raju, 2023). Public participation was again key in these campaigns, for though initiated by the then Left-wing governments, they were soon taken up by non-governmental agencies, community organisations, etc. Most of Kerala's efforts towards literacy was achieved within a year, between the years 1990 and 1991, when it was declared the most literate state in India (Kumar, 1993).

Attempts towards social development in Kerala is not restricted to education. Kerala tops the country in terms of many other key human development indices like sex ratio, life expectancy, etc, despite low income rates – collectively called the 'Kerala Model' of development (Parayil, 2010).

To cite more recent examples, in 2020, Kerala became the first Indian state to have ICT-enabled hi-tech classrooms in all public schools, according to Chief Minister Pinarayi Vijayan (Krishnakumar, 2020). The state stands first in the School Education Quality Index published by Indian government's think tank NITI Aayog in 2019. As per UNESCO's 'Global Education Monitoring Report' of 2023, Kerala's successful use of technology in education deserves praise. The report specially mentions the state General Education Department's 'SchoolWiki' project, which connects schools to facilitate collaborative content creation and learning. It adds that at least 2 million computers in the state are equipped latest open-source software, due to the state's free software policy (UNESCO, 2023). Further back in 2019, the Kerala High Court had declared access to internet a basic right (LiveLaw, 2019). Kerala is now said to be on the move towards complete digital literacy, as per the state Ministry of General Education (The Hindu, 2023).

'First Bell': A Radical Alternative

Kerala's innovative 'First Bell' initiative for the academic year 2020-21 was orchestrated by a collaboration among several key agencies owned by the state Ministry of General Education: the Kerala Infrastructure and Technology for Education (KITE), the State Council of Educational Research and Training (SCERT), Samagra Shiksha Kerala (SSK), and the State Institute of Educational Technology (SIET). Together, they executed a virtual school education program that aimed to address the challenges posed by the pandemic and ensure continued learning for students across the state (First Bell website).

The program's cornerstone was the telecast of classes on the KITE-run 'Victers' channel, following a daily timetable publicised statewide. These classes, ranging from Grades I to X and XII, were aired on weekdays from 9:30 am to 5:30 pm. The sessions varied in duration, some lasting thirty minutes while others extended up to two hours (First Bell website). To enhance accessibility, the classes were not only broadcast on the Victers channel but also uploaded on YouTube (@itsvicters) and the program's dedicated website (First Bell website). Moreover, they were made available for download, allowing students to view them later. In a

bid to reach even remote areas, the videos were accessible at Akshaya Centres, state government-run resource hubs established across various localities (Akshaya Centre website).

Before the trial lessons commenced, Samagra Shiksha Kerala conducted an extensive survey to gauge the number of students in government/aided schools without internet connections or access to television. Shockingly, the survey estimated that over 2,61,754 families, roughly 6 per cent of the total, lacked these essential resources (The Hindu, 2020). Tragically, one of the individuals on this list, a 14-year-old, succumbed to suicide. This revelation prompted an urgent need for action (PTI, 2020). Consequently, teachers underwent rigorous training, with around 82,000 teachers passing the preparatory program. Through necessary interventions and modifications, the number of households without access to virtual lessons reduced significantly, dropping from 2.6 lakhs to 1.15 lakhs by May 31st (Radhakrishnan, 2020).

Expressing the government's commitment, Kerala's Education Minister, C. Raveendranath, highlighted the initiative's importance in mitigating the disruption caused by the pandemic on one of his Facebook Live sessions. He called for public involvement during the initial trial week, encouraging feedback on the program's efficacy and identifying individuals unable to access these classes (Raveendranath, 2020).

As the trial period neared completion, the number of households without access further decreased to 17,774 by June 11th, prompting the announcement of the second phase of the 'First Bell' initiative, set to commence by June 15th (IANS, 2020).

As of Jan 30, 2021, the subscriber count of the YouTube channel of VICTERS has crossed over 2.4 million. Apart from India, the classes were viewed by people from Middle East, USA and Europe too (IANS, 2021). Approximately 27 terabyte data was downloaded in a single day through the website (IANS, 2020). The success of the 'First Bell' program led to an overwhelming demand for the re-telecast of these virtual lessons, despite the Victers channel airing content round the clock. To meet this demand, the authorities launched another channel, called 'Kite Victers PLUS', in September 2021, with similar educational objectives (Ibid). In fact, Victers is an acronym for 'Versatile ICT Enabled Resource for Students'.

The suicide highlighted the urgency and necessity of inclusive measures. In response, various progressive organisations stepped up their efforts to distribute television sets and other essential devices to facilitate virtual education. Youth and student organisations like the Democratic Youth Federation of India (DYFI), the Students' Federation of India (SFI), and tech groups in Kerala were at the forefront of this movement (John, 2020). Soon, governmental, and non-governmental agencies, irrespective of political affiliations, actively joined in (Mathruhumi News Live, 2020). Common study rooms were established even in remote areas, utilising libraries (ANI, 2020), and Akshaya Centres as hubs for students lacking electronic devices.

Dr. T. M. Thomas Isaac, the then Finance Minister, emphasised the critical role of widespread public support in Kerala's educational progress. He urged collective action to ensure that students, especially from marginalised backgrounds, did not fall behind in academics. The local government took proactive steps by offering financial support for the procurement of television sets and laptops (Isaac, 2020). The Kerala State Financial Enterprises, in collaboration with local self-governing bodies, undertook the responsibility of addressing this issue at the grassroots level. MLA funds were directed toward purchasing

TVs and laptops, while various governmental and non-governmental bodies collaborated to set up study centres in communities.

The engagement with local communities and civil society underscored the decentralised nature of Kerala's approach to addressing the digital divide. Efforts were directed towards determining the families without TVs or devices, setting up study centres, and providing necessary infrastructure. This collective action extended to the opening of 'Ayalpakka Padhanakendrangal' (neighbourhood study centres), where students could gather for shared learning experiences using a single television. Kudumbashree, a statewide women's community network, was also mobilised to aid in this initiative. Additionally, schools received support in the form of laptops, projectors, and TVs to assist students in need. The Industries Department launched a 'TV Challenge' on June 4th, inviting public contributions of new television sets to be later distributed to students lacking access. The 'TV Challenge' gained momentum rapidly, with local businesses and individuals enthusiastically contributing television sets to their nearest District Centre. E. P. Jayarajan, the then Minister for Industries, used social media, specifically Facebook, to rally support for the cause (Jayarajan, 2020). Moreover, the participation extended beyond party lines – the Indian National Congress's Ernakulam MP Hibi Eden extended their support by contributing tablets to the 'Tablet Challenge' in their constituencies (Eden, 2020). This groundswell of support and widespread public participation contrasted with protests in other parts of the country against the exclusivity of online education and examinations, as mentioned in a previous section.

Notably, Wayanad, a district in northern Kerala, faced significant challenges, with an estimated 21,653 families lacking access to TVs or devices, accounting for 15 per cent of the district's student population (The Hindu, 2020). To address this, around 9,200 common study centres were established under the guidance of the local MLA, C. K. Saseendran (Saseendran, 2020). Wayanad also houses the highest number of tribal families in the state. Efforts were directed towards ensuring power connections and availability of TVs in these homes. Similar initiatives were undertaken in coastal areas by Matsyafed, the state-run cooperative federation for fisheries development. This initiative began with a count of families lacking adequate facilities along the coast, which was then forwarded to KSFE for action (Isaac, 2020).

Kerala's unique experiment combined the shift to virtual education with concerted efforts to ensure inclusivity through a decentralised process. Class teachers and school headteachers were tasked with identifying students lacking electronic devices (PTI, 2020). Additionally, the government opted against conducting exams online due to the requisite preparation involved (DNA, 2021).

Soon there were approximately 43-45 lakh students relying on KITE Victers for their daily lessons in Kerala (Philip, 2020). However, it is important to note that virtual or remote education cannot fully replicate the comprehensive learning environment provided by physical classrooms. Though the initiative has made substantial strides, it was also faced with the challenge of reaching all the students in the state. Progressive student organisations stressed that governments should prioritise building more schools, classrooms, and enhancing educational infrastructure, considering the deep-rooted digital divide prevalent in the country.

Challenges

While several parts of the country experience a complete standstill in academic activities, with the central government advocating a digital education approach without ensuring sufficient infrastructure, Kerala stands out. What the state witnessed was a historic mass movement, serving as a significant lesson in both preserving public education and democratising virtual learning.

This phase in Kerala's educational transition showcases not just the challenges but also the complexities associated with the shift to online education, underlining the importance of addressing accessibility issues and social concerns within the digital space.

The 'First Bell' initiative faced its own set of challenges, notably marked by the tragic incident in Malappuram, where a 14-year-old girl took her life allegedly due to the lack of resources required for attending the state government's virtual classes. Her father, a daily wage earner from a Scheduled Caste background, revealed the family's struggles with a malfunctioning television and their inability to afford a smartphone (Prashanth, 2020).

In response to this incident, Chief Minister Pinarayi Vijayan reiterated that the initial online classes were trial sessions and would be re-telecast entirely in the following week. Emphasising that the shift towards online education was a temporary measure, he expressed the government's desire to reopen schools at the earliest possible opportunity (Philip, 2020).

However, alongside issues of accessibility, the transition to online learning brought forth socio-political challenges within the digital space. Shortly after the trial classes aired, reports emerged of cyber harassment against some female teachers. Screenshots of these teachers were circulated through newly created "fan pages," prompting the intervention of the Social Justice Department, which initiated legal action in response to these incidents (Indian Express, 2020; NewsMinute, 2020).

Results

In the state's post-pandemic school exams of the academic year 2020-21, Kerala achieved an extraordinary pass percentage of 99.47 per cent, a record even by the state's high standards. Notably, these exams were conducted amidst the pandemic, whereas many other educational boards had opted against holding exams during that time (TNN, 2021). The results were striking, with over 1.2 lakh students securing the highest grade, 'A plus.' This achievement represented a noteworthy increase from the previous academic year, showcasing a rise in the pass percentage from 98.82 percent to 99.47 percent (Ibid).

UNESCO's *India Case Study: Situation Analysis on the Effects of and Responses to Covid-19 on the Education Sector in Asia* of 2021 reports the situation in Kerala as thus:

> Kerala is an exception: about 70 per cent of parents of both younger and adolescent students believe that overall learning progress is the same or better than it would be in school. Kerala has the greatest technology access, and it has also been among the most proactive states in supporting students: it is the only state where nearly everyone who used remote learning reports that the government has provided remote learning resources, more than 90 per cent report that students are speaking with their teachers. (UNESCO, 2021)

Conclusion

In the wake of a global pandemic that disrupted educational landscapes worldwide, Kerala, nestled in the southern reaches of India, embarked on an unprecedented journey in democratising e-learning and online education. This exploration delves into Kerala's pioneering 'First Bell' initiative, an endeavour unparalleled in other Indian states, which sought to democratise access to education, especially for marginalised students. Situated within the larger context of the pandemic's outbreak and the digital divide pervasive in various states, Kerala's distinctive response to COVID-19 stands as a beacon of innovation. Utilising government-run 'First Bell' lessons and a meticulously devised system for accessibility, Kerala not only stands apart in its approach but also underscores a historical commitment to literacy, education, and egalitarian principles. This essay navigates through Kerala's unique initiatives, shedding light on its remarkable efforts to bridge the digital gap and revolutionise learning opportunities, inviting a deeper exploration of its transformative impact amidst a landscape grappling with educational disparities. Upon examining available statistics and online resources, it becomes evident that Kerala distinguishes itself in terms of technology accessibility. The concerted efforts of the government and civil society have notably extended access, particularly to those residing on the fringes of society. While acknowledging its imperfections, Kerala's exceptional approach stands out in stark contrast to the scenario prevalent across various parts of the nation. Kerala's noteworthy initiatives in preserving public education and democratising virtual learning demand a comprehensive exploration. My essay merely skims the surface, leaving numerous unanswered questions and unexplored avenues, which I aim to thoroughly investigate in the future.

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Studying Teachers' Ability to Learner-Centered Pedagogy

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Abstract

In modern education, under the influence of humanistic psychology originated by A. Maslow and C. Rogers, learner-centered pedagogy is widely developing. This approach imposes certain requirements on the competence of educators. One such competency is the ability to see the learning task through the child's eyes, which contributes to a productive dialogue and the disclosure of the learner's full potential. In our study, this ability was examined in 270 graduate students who are currently schoolteachers. They observed children in their classrooms while the children were solving various problems in reading, writing, math, and drawing. Then, the teachers answered the following question in writing: "What sequence of actions would the child you were observing have to perform in order to solve his/her problem correctly?" Their answers can be divided into four categories: (a) sociocentric, if they correctly identified the necessary sequence of the child's actions; (b) egocentric, if they rather determined the sequence of their own actions at the time of observing the child; (c) mixed, i.e., including both of the above categories; and (d) others, in which their answers were replaced by irrelevant reasoning. Results showed that 36.6% of the schoolteachers failed the experimental task (categories (b) and (d)). The study author will direct her farther efforts toward improving her *Child Development and Learning* course's curriculum, implementing various assignments into it based on the ability to see the learning tasks through children's eyes. This training will develop the teachers' skills for learner-centered pedagogy.

Keywords: Humanistic Doctrine in Education, Learner-Centered Pedagogy, Solving Problems, Sociocentrism, Egocentrism, Gap in Knowledge, Training for Teachers

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Introduction

The idea of progressive education arose long before its appearance in modern society. In fact, all outstanding pedagogues of the past developed pedagogical science in the direction of greater democratization. Improvement of the forms of interaction between the teacher and the students in the educational process has always been and remains a priority.

Industrial society was characterized by traditional education based on an authoritarian leadership style, classical training of students, and reliance on direct instructions. Lectures and demonstrations of visual aids were the main teaching methods. The transition to the post-industrial era required a restructuring in many areas of science and human practice, not least in education. The term "progressive education" came into widespread use, distinguishing progressive educational methodologies from traditional 19th-century educational programs.

But not every progressive technique that worked fruitfully in one or several experimental educational institutions became successful on a national scale. The adaptability of unique learning models depended on many factors, the role of which could not always be foreseen. Only in the middle of the 20th century did the most striking discoveries of the world's philosophical and psychological thought naturally combine within a new educational paradigm. It received the name of humanistic education or learner-centered pedagogy.

Unlike the old traditional schools, in the new humanistic educational environment, the student is active and involved in the learning process, not just consuming information but also generating knowledge and ideas. The learner-centered approach to education puts students' interests first. Schoolchildren participate in choosing their curriculum and managing the pace of their intellectual growth. They bear greater responsibility for their own education. It is precisely such members of society that a democratic society needs. And in today's education, learning-centered pedagogy is widely developing.

However, the learner-centered approach imposes certain requirements on the competence of teachers. One such competence is the teacher's ability to see learning situations through the students' eyes. Without this, neither full-fledged dialogue in the classroom nor effective teaching and successful comprehension of knowledge are possible. Training young teachers in this skill should be recognized as one of today's most important pedagogical tasks.

This study's purpose was to determine how many university students enrolled in an educational program and simultaneously working in the school system had the ability to implement learner-centered teaching. The subjects of the study were Touro graduate students majoring in education who were currently working in preschools and elementary schools in New York City.

Theoretical Frame

Before the spread of learner-centered pedagogy, the idea of progressive education was developed in the works of J. Dewey, M. Montessori, J. Piaget, and L. Vygotsky. They belonged to different areas of professional activity and were interested in different aspects of education, from the adaptation of educational outcomes to the requirements of everyday life and the organization of the learning environment to the nature of children's acquisition of knowledge. But together, these theories gave a very powerful impetus to the emergence of a humanistic doctrine in education in the second half of the 20th century.

An American philosopher and educational reformer, John Dewey (1859–1952), founded an experimental school modeled after a democratic society. He stood up for the children who considered schooling in those years to be suppressive and routine, and the educational school model he created helped his students become independent and capable of self-realization. At his school, students acquired knowledge not by memorizing facts and repeatedly listening to lectures but by solving problems that might arise in real life (Mooney, 2013, p. 17).

An Italian doctor, Maria Montessori (1870–1952), a specialist in the field of early childhood development, was convinced that education is successful only when children are also given an opportunity to lead their learning. According to her methodology, children are able to teach themselves if they are provided with the right conditions. "Soon she determined that problems existed not in the children but in the adults, in their approaches, and in the environments they provided" (Mooney, 2013, p. 36). M. Montessori was the first to reorganize the preschool learning environment, making it learner-centered mentally and physically. In Montessori's classrooms, the size of furnishings and materials strictly corresponded to the age and physical build of children, which was an unconditioned innovation in those years.

A Swiss scientist, Jean Piaget (1896–1956), the founder of child cognitive psychology, described the features of the development of children; this is his invaluable merit (McLeod, 2023a). He rejected the 19th- and early 20th-century view of learning as a passive reflection of reality and proposed the concept of active learning. His approach was named "cognitive constructivism" ("Constructivism in teaching," 2021; "Learning theory," n.d.). According to Piaget, learning is a process of transformation of knowledge, not just accumulation of it. Unlike a traditional teacher, who fills children with ready-made ideas and facts, a constructivist teacher creates conditions in which the students themselves seek answers to their questions ("Application of Jean Piaget's Theory," n.d.).

A Soviet psychologist, Leo Vygotsky (1892–1939), the founder of the socio-cultural direction in the development of world psychological science, emphasized the social nature of learning. He pointed out the importance for children, when learning, to interact with more knowledgeable people; that's why his approach was named "social constructivism" (Learning Theory, n.d.). According to Vygotsky, dialogue is a necessary condition for learning and comprehending new information about the world. "Vygotsky's primary contribution to our understanding of young children's development is his understanding of the importance of interaction with teachers and peers in advancing children's knowledge" (Mooney, 2013, p. 101).

These progressive educators of modern times were characterized by the unacceptability of an authoritarian style of interaction with students. Despite all the differences in their theories, they shared the following ideas: "[…] education should be child-centered; education must be both active and interactive; and education must involve the social world of the child and the community" (Mooney, 2013, p. 16).

In the second half of the last century, the learner-centered approach to education became widespread, embodying the best features of the progressive theories of the recent past. And at the same time, it was an independent approach that was developed under the influence of humanistic psychology, initiated by American psychologists Abraham Maslow (1908–1970) and Carl Rogers (1902–1987).

C. Rogers, a psychotherapist, and clinical and educational psychologist, known for his person-centered research, proposed the concept of "client-centered therapy" (McLeod, 2023b). The concept was universal, and the relationship between teacher and student could be seen as the relationship between psychotherapist and client.

Just as in psychotherapy, where there are two opposite approaches—therapist-centered psychotherapy vs. client-centered psychotherapy—in education, there are two kinds of learning environments—teacher-centered vs. learner-centered ones. In the old traditional educational environment, students listened to lectures, completed written assignments, and worked primarily individually. In a new humanistic educational environment, they are active and more involved in the learning process; they do not just consume information but generate ideas and take greater responsibility for their own learning.

According to C. Rogers, one of the most important conditions for this new type of teaching is that the teacher has an "empathic understanding" of the student. Empathy, from the Greek *empatheia,* is "the ability to imagine oneself in another's place and understand the other's feelings, desires, ideas, and actions" (Britannica, n.d.). C. Rogers defined such an ability in teachers as follows:

> This attitude of standing in the other's shoes, of viewing the world through the student's eyes, is almost unheard of in the classroom. One could listen to thousands of ordinary classroom interactions without coming across one instance of clearly communicated, sensitively accurate empathic understanding. But it has a tremendously releasing effect when it occurs. (Rogers & Freiberg, 1994, p. 158)

With the entry of society into the Information Age and the development of new technologies, multiple scientific attempts have been made to apply the student-centered approach in e-learning and other information environments. Here's what experts say about it:

> In this respect, person-centered principles already have proven to be most effective. [...] the present is optimally suited to bring together student-centered teaching and new media in order to ensure effectiveness while equipping teaching and learning with more and life-long personal meaning. (Motschnig-Pitrik & Holzinger, 2002, p. 170)

Methodology

The study was based on the following two hypotheses:
1. One of the most important psychological characteristics underlining the teacher's ability to implement learner-centered pedagogy is the ability to see the learning situation and learning task through the eyes of a student.
2. Among the indicators of this competency is the teacher's capability to deeply focus attention on the student and understand how s/he thinks while solving the learning problem.

The task of the study was to determine how common the ability for learner-centered pedagogy is among university students currently working in schools.

Two hundred and seventy teachers participated in the experiment. They all attended the author's online course *Child Development and Learning in Cultural Context* at the Touro

Graduate School of Education in 2022-2023. (They were taking all their other GSE courses online as well.) The majority of participants were female (75%).

The procedure was as follows: the participants observed children in their classrooms while children were solving various problems in reading, writing, math, drawing, and social sciences. For our study, they answered the following question: "What sequence of actions did the student that you were observing perform to solve his or her problem?"

A computerized survey served as the study instrument, so data collection was done online. The participants submitted their answers electronically as one of their homework assignments for the course. Two experts certified as elementary and middle school educators helped the study's author analyze experimental data.

Results

Analysis of Data

The analysis of the collected data was carried out manually. Each answer was analyzed from the point of view of its compliance with the experimental instructions, or more precisely, with the two main requirements contained in them. Firstly, in a learning situation, attention should be focused on the student, and secondly, the teacher should describe the sequence of the student's intellectual actions necessary to solve the problem. Thus, the two main criteria for analyzing the study participants' responses were "the presence of a student" and "the presence of a sequence of his/her actions." Fig. 1 provides an example of a response that satisfies both criteria.
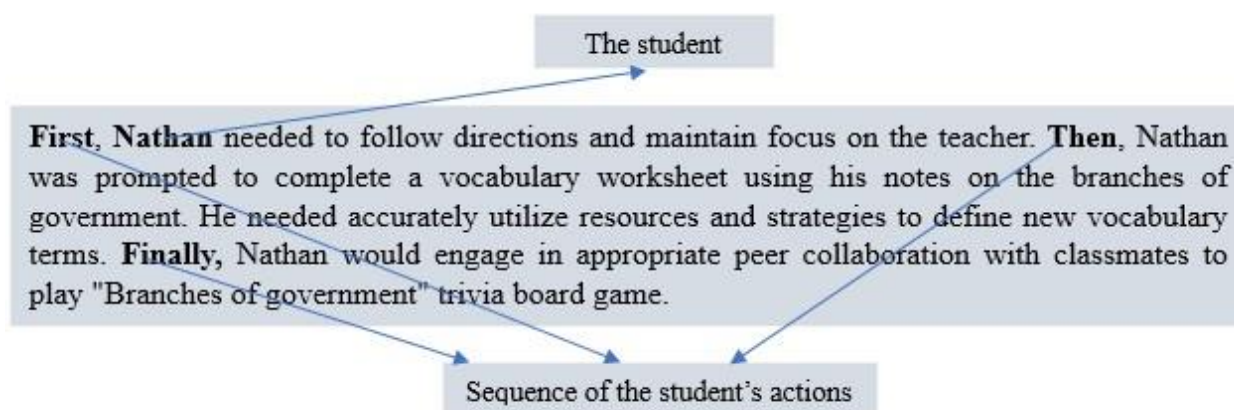
Figure. 1: A study participant's answer and the analysis of its content

"The student" and "the sequence of the student's actions" were the two key concepts, and teachers' answers were expected to address these aspects of the experimental situation. The first concept allows us to discover the schoolteacher's tendency to focus on a student's activity in a learning situation, and the second one reflects the schoolteacher's ability to specifically and in detail describe the student's physical as well as intellectual actions in a learning situation.

Categorization of Data

Direction of centration. The study participants' answers could be divided into four categories: sociocentric, egocentric, mixed, and others. Answers were *sociocentric* if the study participants primarily described the students in learning situations. An example is presented in both the paragraph below and Fig. 2, where the teacher's attention is focused exclusively on the student:

> The main task that Jake should be accomplishing while being observed is how to solve one variable by using elimination. After he eliminates the variable, he can solve for the other using substitution. He solved for *x*. The positive *4y* and negative *4y* gives us a sum of 0, that is called elimination. In doing so, he is able to solve for *x* first and then substitute for *x* to find *y*-value. (U.T.V., math lesson, fall of 2023)

Figure 2: Illustration of the math problem's solution in the sociocentric answer

Answers were *egocentric* if they told mostly about the teacher and rather determined her or his own actions and reasonings at the time of observing the student. Such an answer is presented in the next example. There, the focus is on the teacher. The volume of text related to the description of the teacher's activities is even three times larger than the statements related to the student. Little is said about the student, only generally and indirectly. An example is presented below:

> I gave Robert a word problem to work on that involved counting, grouping, and division. I provided a hint: multiple methods can be used to solve the problem. I was watching Robert to make sure that he could choose appropriate strategies. When it was necessary, I explained how to correct his errors. (R.R., math lesson, spring of 2023)

It should be noted, however, that the mere fact that the teacher is mentioned in the response does not yet mean that this response should be classified as egocentric. It was possible to mention the teacher in the description, but the main object of observation should still remain the student and his activity.

Answers were considered *mixed* if they included both of the above categories. That is, the study participant's attention was directed to both the teacher and the student; descriptions of their activities were equivalent in their semantic load, and one was incomprehensible without the other. An example of such an answer is:

> I read a book aloud in the classroom and asked questions about its characters in order to comprehend if the story's plot was understandable for the students. Paul answered most of the inferential questions. (M.A., reading lesson, fall of 2022)

Answers were categorized as "*others*" when the explanations of the student's activity were replaced by irrelevant reasoning. For example, "Alisa benefited greatly from visual representations when learning new concepts."

According to the results, **42.7%** of schoolteachers tended to focus their attention on students in experimental learning situations, which represented the *sociocentric* category. Meanwhile, 30.2% of the investigated population of schoolteachers failed to do so, and they fell into the category of *egocentric*. The two remaining categories—*mixed* and *others*—did not show any definite and stable trends. In Fig. 3, the percentage of categories named above is shown.
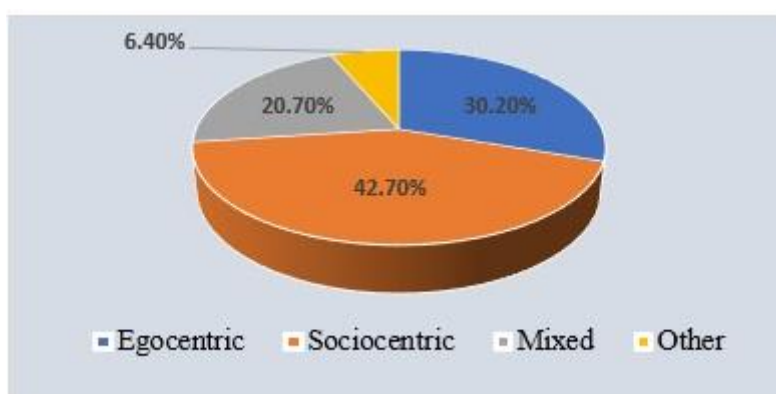
Figure 3: Distribution of the teachers' answers by categories

Specificity of the description. In the study participants' answers, general formulations prevailed about what the student observed or the observer himself or herself should have done in the learning situation. In the example of the egocentric answer illustrated above, one of the study participants, a math teacher, failed to describe her student Robert's intellectual actions consistently and in detail. She only briefly informed us about how he solved his problem—only that he had to perform three different operations. Of course, this is not enough to consider the experimental condition fulfilled.

In the example of the mixed answer, another study participant, a reading teacher, gave a very vague description of what was going on in her classroom. She identified neither the title of the book that she was reading to her students, nor what characters of the book they were supposed to discuss, nor what questions about the book's content they were answering. Even Paul's activity while she was observing him is not described in detail, although specifics were considered necessary according to the study conditions.

However, **38.7%** of the investigated population still followed the second experimental requirement and specified the students' sequence of actions when solving the problems. This is an example of how an answer looks that unconditionally satisfies the requirement:

> To create a pumpkin patch drawing, Jasper was using the "seagull technique," which I, his art instructor, demonstrated to the class at the beginning of the lesson. First, following the explanations given, he drew a seagull. Second, he drew a line towards the grass on each side of the seagull's wing. Third, he looked at how I and other

students made a round bottom and easily followed this step as well. Fourth, he created a few vertical lines on the pumpkin to make it volumetric figure. (E.K., visual art lesson, spring of 2022)

In her answer, this study participant, an art teacher, presented a complete sequence of actions performed by her student Jasper, who drew a pumpkin using a given model technique. In the sociocentric answer's example illustrated above, the other study participant, a mathematics teacher, reproduced the entire logical chain of operations used by his student Jake and needed to solve a system of linear equations.

A distinctive feature of these and similar answers is the teacher's ability to "unfold" the intellectual activity process of the student solving the problem, that is, to present it in a step-by-step form and analyze it. It is noteworthy that the majority of the schoolteachers surveyed in our study—**61.3%**—did not cope with this task in full.

Learner-centered ability. A little more than one-third of the investigated population—**36%**—completed the experimental task, having satisfied both instructional requirements. These study participants were deeply concentrated on the student under observation, primarily reflecting his/her intellectual activity, and identified and described in detail the sequence of his or her actions while solving the problem given.

Discussion

Causes of Teachers' Egocentrism

Only a little more than one-third of the investigated population coped with the experimental task. Every third study participant demonstrated qualities that suggest s/he had the ability to implement learner-centered pedagogy. Every third is a small number. However, Rogers also discovered that the student-centered technique is not for everyone, and that "empathic understanding" is a rare personality quality. If we look at the result obtained from this angle, it is not at all hopeless.

It is alarming that another third of the population studied did not cope with the experimental task at all. These study participants focused their attention on themselves and talked exclusively or mostly about their own activities in a learning situation. This psychological feature is called "egocentrism." It should be noted that we are not talking about egocentrism as a pathological phenomenon. The subject of this discussion is the egocentrism of healthy individuals.

Egocentrism is a childish trait; it is observed in preschool-age children when thinking is just developing. "Egocentrism refers to the child's inability to see a situation from another person's point of view. The egocentric child assumes that other people see, hear, and feel exactly the same as he does" (McLeod, 2023a). Egocentrism reappears in adolescence and is associated with the process of identity development, which does not always proceed without conflicts (Erikson, 1968, pp. 135–138). Finally, egocentrism manifests itself in old age, where it is associated with cognitive decline. Egocentrism in young and healthy adults is a sign of infantility, personal immaturity, and problems with identity. With a favorable passage of the teenage crisis, egocentrism disappears. Adults who still exhibit egocentrism were probably unable to adequately go through the stage of developing their identity in adolescence (Zheldochenko & Nikolenko, 2020, p. 7).

Apparently, these study participants poorly knew the psychology and peculiarities of children's development. They just did not understand what it means "to put themselves in the student's shoes." They were probably not teachers by vocation, but they came to this profession guided by other considerations. It is known that it is not the best high school graduates who enter our pedagogical colleges; after completing their bachelor's and master's programs, they come to work in schools, but their motivation, intuition, and interactive skills can still be underdeveloped.

It should be noted that this is different from the schools whose education is considered exemplary, for example, in Finland, Singapore, or Japan, where teaching positions are given to the most capable and highly motivated individuals ("How Teachers Are Trained in Finland," n.d.; "Singapore Mathematical School," n.d.). "In Singapore, teaching is a respectable profession. Teachers are selected from the top one-third of their age cohort... Teachers are a top priority in Singapore, as they should be in every education system" (Lee, 2020, pp. 90–91).

Causes of Teachers' Inability to Analyze Students' Thinking

Even if the study participants were able to see the tasks from children's perspectives, they were not always able to "unfold" the process of solving them into a step-by-step intellectual activity. This fact can be partially explained by their lack of responsibility or motivation when doing their homework (the experimental assignment). However, the more probable reason seems to be that these teachers were not properly trained in their school years themselves; probably, their instructors did not require them to present solutions to problems in detail. Such study participants had not developed a culture of mental work.

In the same years when American psychologists were developing the theory of humanistic education, a Soviet educational psychologist, Petr Galperin (1902–1988), created his theory of step-by-step formation of mental actions (Galperin, 2017, pp. 3–20). Its essence was that, when learning a mental or physical action, the child forms it step by step, consolidating the result of learning at the end of each step. When the entire action is fully formed, it goes into the mental plan and becomes automated. Subsequently, if necessary, the individual can "unfold" his solution to check the steps and make sure that he performs his task or a similar one correctly. Solving a problem is developing a skill, and the method of step-by-step formation of mental actions is more appropriate and useful in the case of studying how to solve problems than, say, the trial-and-error method.

Our study participants needed this skill to perform an experimental task in order to compare their solutions with the ones that the learners under their observation created. Without this, it was impossible to adequately understand whether the child correctly saw the goal of his activity, the available means of achieving the goal, and whether she or he could independently find a strategy for solving the problem. Only by mastering this pedagogical technique can one teach children effectively and successfully.

Teachers Can be Trained to Become Learner-Centered

Of undoubted interest in connection with the prospect of training is the relatively small group of study participants—one-fifth of the surveyed population of schoolteachers—whose answers were *mixed*. Their answers contained some descriptions of the intellectual activity of learners solving problems but were unsystematized and disorganized, did not set out the sequence of

actions taken by the child, and generalized what was happening rather than meeting the requirement of specificity. However, in these answers, there was some seed from which useful shoots could sprout with the proper instructional approach. These representatives of the schoolteachers' population should be taught to think in a disciplined manner, that is, to analyze when necessary and to generalize if the task requires it. As the author's previous studies have shown, the skills for analytical-synthetic thinking are a serious problem for today's university students, going beyond the boundaries of one culture (Toom & Inshakova, 2019, pp. 56–57).

From the point of view of the subsequent training, the most perspective subjects of our study seemed to be those whose answers have simultaneously fallen into the categories of *non-specific* and *mixed*. They did not fully cope with the task assigned to them in the study, but they have the preconditions for the possible development of the necessary skills.

The study author's further efforts will be directed towards improving her *Child Development and Learning* course's curriculum and implementing various assignments into it based on the ability to see the learning tasks through other people's eyes, that is, children, adults, and even theorists who have offered their unique approaches to human development and learning. Such training will help the teachers develop skills for learner-centered pedagogy.

That's how the idea of a complex training program for the schoolteachers in the framework of the course curriculum appeared. The teacher's ability to see the learning situation through the student's eyes and understand how the student thinks when solving a learning problem is based on both the teacher's "empathic understanding" and the general culture of his or her thinking. Apparently, one does not exist without the other.

Limitations

The study was conducted at an average American university, in a typical school of education, and likely reflects some of the trends that have developed in the field of education in the country today. However, generalization to a larger teacher population should be done with caution.

The results of this study are limited by the sampling methodology employed. All study participants belonged to one New York university, one educational school, whose students were mostly drawn from the state where it is located. 75% of the participants were female and taught in pre- and elementary schools. These characteristics do not fully coincide with the characteristics of the entire Touro University population of graduate students who are current schoolteachers. In addition, the results are limited by the study instrument used because written self-reports may somewhat simplistically reflect actual classroom situations and own cognitive activities.

The reliability of the findings needs to be tested in a full-scale study that includes experimental and control groups and examines the influence of various factors, including pre-training, on teachers' performance in the study.

Conclusion

Both study hypotheses were confirmed. Learner-centered teachers could deeply focus on a student who solves a problem to monitor his or her intellectual activity and present it in the

form of a sequence of actions. The study task was completed. More than one-third of the study participants (36.0%) showed abilities for learner-centered pedagogy.

The direction of centration and *the specificity of descriptions* are two characteristics or criteria that indicate the teacher's competency. According to the first criterion, the answers of the study participants can be divided into four categories: sociocentric, egocentric, mixed, and others. According to the second criterion, their answers can be divided into specific and non-specific ones.

Some results obtained seem to be alarming:
1. Almost one-third of the surveyed population, whose answers were egocentric (30.2%), lacked "empathic understanding" of children. Perhaps these schoolteachers' career choice in education was a mistake.
2. About two-thirds of the study participants, whose answers were non-specific (61.3%), had difficulties understanding the logic of how their students were thinking when solving problems. Perhaps they lacked a culture of intellectual work.

However, other results obtained are encouraging. One-fifth of the study population (20.7%) showed preconditions for the possible development of the skills for learner-centered pedagogy.

The results allowed us to outline a possible direction for the training. In the framework of the course curriculum, a training program will be organized that will help schoolteachers develop skills contributing to their cognitive culture and mastery of a learner-centered approach to education.

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Students' Perceptions of Virtual Laboratories in University Physics Classes

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Abstract

The integration of virtual laboratories (VLs) in education has gained significant attention, especially post-Covid-19, due to their potential to augment learning experiences and facilitate distance education in higher institutions. This study evaluates students' perceptions of VLs effectiveness in undergraduate physics courses, addressing two key questions: How do students perceive VLs' effectiveness in understanding theoretical concepts? What are the reported advantages and disadvantages of using VLs compared to traditional on-site laboratories? A questionnaire-based approach was used, involving 80 undergraduate students enrolled in physics courses. The findings indicate a positive impact, with 57.5% of students favoring VLs over on-site laboratories. Students perceive them as valuable tools enhancing the learning experience. While acknowledging these positive outcomes, some students highlight disadvantages of VLs, emphasizing the importance of physical experiments. Consequently, adopting a blended laboratory approach emerges as a promising strategy for educational transformation. By sharing this experience, the authors aim to inspire other educators to explore the potential of integrating VLs to enhance their own courses.

Keyword: Learning Experience, Physics Courses, Virtual Laboratories

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Introduction

Virtual laboratories (VLs) are free online educational tools that revolutionize science learning through the integration of visualization techniques, such as animations, simulations, and recorded videos (Diwakar et al., 2015; Nair et al., 2012; Radhamani et al., 2014; Scanlon et al., 2002; Tüysüz, 2010). These labs are designed as content-rich interactive materials, providing users with a real impression of the laboratory experience through click gestures that emulate experimental protocols (Diwakar et al., 2019; Salmerón-Manzano & Manzano-Agugliaro, 2018).

The initiation of the VL traces its roots to the late 20th century. Initially these laboratories have found utility among both teachers and students as complements to traditional on-site labs (Vasiliadou, 2020). With advancements in technology and improved internet connectivity, VLs have evolved to become more sophisticated and accessible. However, within the research community, varying perspectives emerge. Some studies disagree with the efficacy of this new educational tool, positing that students gain more information when using real equipment (Schubert et al., 2001; Schuemie et al., 2001), while others argue that virtual or remote labs contribute significantly to education (Dewhurst et al., 2000; Sicker et al., 2005).

In a traditional laboratory, students typically engage in lectures to grasp theoretical concepts, followed by hands-on sessions to apply these theories in practical scenarios (Nedic et al., 2008). However, if students struggle to comprehend the theoretical information conveyed during a laboratory experiment, they may resort to memorization, leading to a risk of course failure. Such setbacks can foster negative attitudes towards the course among students who have experienced academic challenges (Trundle & Bell, 2010). Achieving a deep understanding of scientific theories poses challenges with traditional teaching methods (Achuthan et al., 2018).

To address these challenges, VLs have emerged as solutions to the limitations encountered in on-site laboratories, functioning as supplements to classroom teaching. By providing an artificial working environment, VLs aim to enhance the learning experience more effectively (Bijlani, 2012; Trundle & Bell, 2010). Numerous studies have demonstrated that students' conceptual understanding in VLs is comparable to or even surpasses that achieved in traditional laboratory settings (Brinson, 2015; Nair et al., 2012; Raman et al., 2014). Moreover, these studies suggest that VLs not only contribute to improved learning but also prove more effective than traditional methods (Achuthan et al., 2017; Magin & Kanapathipillai, 2000; Raineri, 2001). Another body of research even indicates that VLs can adequately substitute traditional labs (Corter et al., 2011; Lang, 2012; Zacharia & Olympiou, 2011), achieving comparable learning outcomes to hands-on laboratories across various science education domains (Ma & Nickerson, 2006; Moosvi et al., 2019; Stahre Wästberg et al., 2019).

Additionally, the growing demands of using VLs became evident when educational activities were affected by the COVID-19 pandemic (Ekarattanawong et al., 2023; Gamage et al., 2020). While theoretical courses transitioned to online delivery, educational institutions had difficulty in fulfilling the program requirements related to laboratory experiments due to the closure of universities and their laboratories.

So, due to the rapid spread of COVID-19 and the delay in finding a vaccine, numerous universities have incorporated VLs as a resource to complement and reinforce the teaching and learning process before and during pandemic closures (García-Vela et al., 2020; Joshi et al., 2021; Radhamani et al., 2021). Various publications offer guidance to institutions on effectively integrating VLs into the education process and encourage their adoption by learners (Çivril & Özkul, 2021).

The use of VLs within the context of distance education has gained substantial popularity in learning (Dhawan, S. 2020) since they have many educational advantages (Fiscarelli et al., 2013; Rotimi et al., 2012; Rutten et al., 2012; Smetana & Bell, 2012; Tatli & Ayas, 2011; Trundle & Bell, 2010; Zabunov, 2013):
- Carry out experiments in a shorter time.
- Carrying out dangerous experiments in a safe environment.
- Low-cost solution: no equipment is needed for performing the experimentations, all the development work and the implementation are done by the computer.
- Enabling students to progress at their own pace, so improve the self-driven learning (Radhamani et al., 2015).
- Providing students with immediate feedback so that they can check their learning.
- Increasing the learners' motivation and their ability to self-study.
- Accessing the virtual laboratory by learners is allowed at all times and places that multiple learners can do the same experiment at the same time (El Kharki et al., 2021).
- Recreating events that would be difficult or impossible to observed in traditional laboratory (Mishra et al., 2020).
- Improve students' conceptual understanding (Gunawan et al., 2018).

Methodology

The study focused on the usage of VLs by undergraduate engineering students at the Mediterranean Institute of Technology (MedTech). As a private co-educational university, MedTech has a diverse student population, comprising approximately 2,000 undergraduates and graduates from over 10 different nationalities. MedTech's engineering school is part of the South Mediterranean University, an English-speaking educational institution in Tunisia, established in 2002.

This study is based on data collected from two distinct cohorts:
- First-year pre-engineering students enrolled in the classical mechanics course, a foundational component of the engineering curriculum. This course is essential for establishing a solid understanding of principles such as motion, moment of forces and conservation of energy in mechanical systems.
- Second-year pre-engineering students participating in the optics and waves course, a fundamental second-year course that delves into the principles of optics and wave phenomena in engineering.

Both physics courses have a biweekly laboratory component aimed at applying the theoretical concepts learned in lectures. As part of our approach, we chose to implement one of the laboratories in a virtual format. Following this virtual session, we conducted a survey to investigate the factors influencing students' acceptance of VLs.

The survey was administered in Spring 2023, involving 80 undergraduate students enrolled in physics courses, including two first-year groups and one second-year group. Before completing the web-based survey, students participated in one session of VLs. The survey respondents comprised 34 female students and 46 male students. The survey encompassed a combination of twenty 5-point Likert scale questions, ranging from 1 = strongly disagree to 5 = strongly agree, allowing students to express the extent of their agreement, along with one open-ended question.

To address the research questions, students gave their feedback anonymously relating to their laboratory experiences at the end of the virtual lab session.

For the first-year students, based on previous research (Radhamani et al., 2021), we decided to use the free platform Amrita (https://vlab.amrita.edu/index.php), which contains a lot of VLs in different fields including chemistry, physics, mechanics, and more. The learning objective of the virtual laboratory is to study the two types of collision: elastic and inelastic. Building on prior research (Abdjul & Ntobuo, 2018; Zulkifli et al., 2022), we opted to utilize the free PHET platform (PHET https://phet.colorado.edu/) for the second-year group to facilitate exploration of standing waves. This choice allowed for the observation and study of phenomena impractical in a traditional laboratory setting. Additionally, it fostered discussions on various resonant modes of vibrations and enabled the calculation of the fundamental resonant frequency.

Data Analysis

Quantitative Study

Derived from the survey outcomes, we present charts illustrating responses to selected questions below:
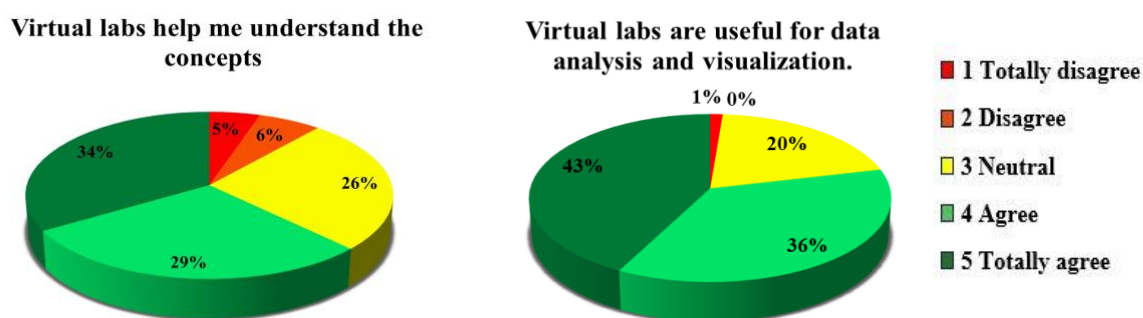
Figure 1: VLs are helpful and useful.

Observing figure 1, it's apparent that over 65% of students confirm the utility of VLs in understanding theoretical concepts. Additionally, a significant 80% affirm the effectiveness of VLs for data analysis and visualization. These findings strongly support the assertion that VLs serve as beneficial and valuable tools in the learning process.
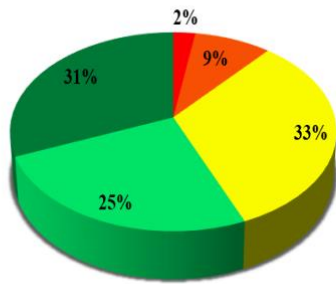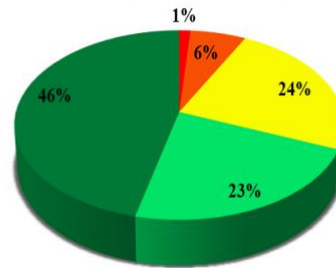
Figure 2: VLs are self-learning tools.

Here, over 50% of students express the ability to advance at their own pace when utilizing VLs. Furthermore, 70% of students affirm that VLs boast a user-friendly interface. These observations indicate that VLs contribute to enhancing learners' motivation and their capacity for self-study, thereby fostering a more self-driven learning experience.
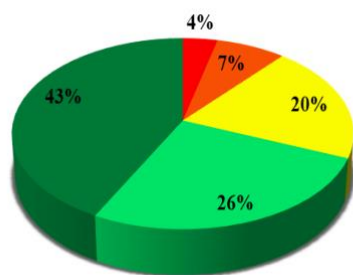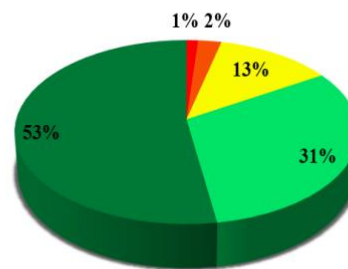
Figure 3: VLs are easy.

The data reveals that over 70% of students affirm the ease of use of VLs, expressing comfort in their utilization. This underlines that VLs are easy-to-use tools for both learning and practical application.
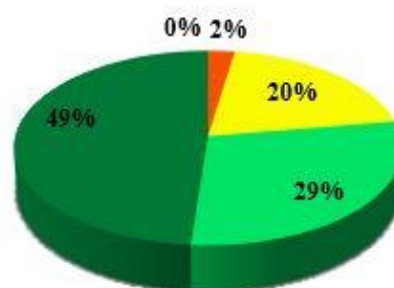
Figure 4: VLs are flexible.

A significant 80% of students acknowledge that access to the virtual laboratory is permitted at all times and locations, with 49% expressing complete agreement. This facilitation of

flexible learning schedules is evident, providing students with the convenience of accessing resources according to their individual preferences and needs.
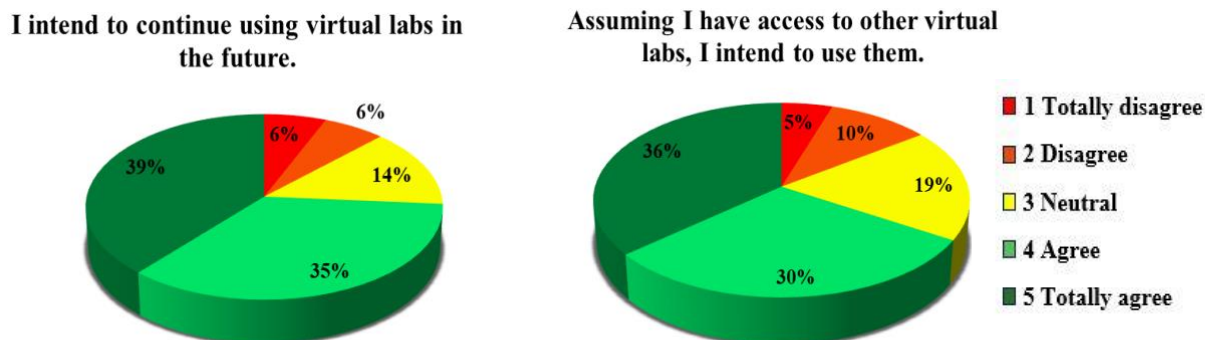
Figure 5: Continuity of use

75% of students confirm their intent to continue using VLs in the future and 66% express agreement with the use of other Virtual Learning Systems (VLS). These findings strongly indicate the remarkable effectiveness and appeal of VLs as valuable educational tools.
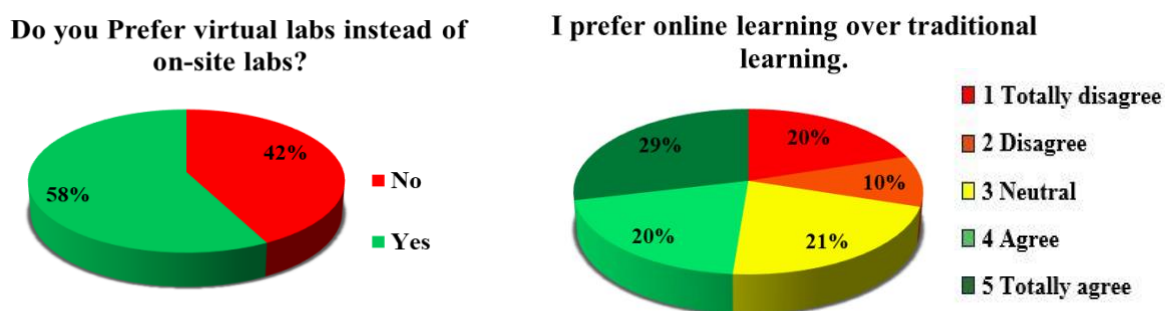
Figure 6: The preferred laboratory

Most students express satisfaction with the use of virtual labs, with 58% expressing a preference for VLs over on-site laboratories. This preference indicates a positive impact of VLs on students' perceptions and experiences.

However, when questioned about their preferred mode of learning, 49% of students lean towards online learning, while 30% favor traditional learning. To comprehend their choices, we conducted a qualitative study.

Qualitative Study

In the qualitative study, we deepened our understanding of the factors influencing students' preferences for learning modes. Through an open-ended question, "*do you Prefer virtual labs instead of on-site labs? Why? Please explain.*"

We explored the effect of their experiences and perceptions with the aim of uncovering qualitative information that complements and enriches the quantitative results.

We resume below in Table1 and table2 the students' responses to the open-ended question in favor and against the use of VLs.

It is easier to plug in values and get accurate results with no human error
It's very practical, useful, Easier, accurate and more efficient
Designed with the latest technology, virtual labs protect students from the dangers they face while conducting some dangerous laboratory experiments.
It is better
You can get more benefits since you are filly focused
It is more fun XD
Avoid the uncertainty of values
They are easier on the eyes for complicated labs, my eyes hurt trying to read big distances or setting small tolerances. And the simulations give much more accurate results anyways. On top of many other benefits like being very easy to access anywhere
Learning through gaming makes it easier, faster, and funnier
Because the values are more precise and exact
More flexible
It takes less time.
I like digital software
It's easier and we have to use technology to understand more.
I can practice more

Table 1: students' response in favor of VLs use.

Students are totally supportive of the use of virtual labs (VL), as indicated by their positive responses in Table 1 and their preferences for this educational tool. They think that VLs are useful, helpful, practical, flexible, easier…tools to learn. The high level of agreement and approval on the part of students suggests a strong tendency to embrace virtual labs as effective and beneficial elements of their learning experiences. Which confirm the positive students' perception of the effectiveness of VLs.

Nevertheless, it is important to recognize that some responses indicate reservations or opposition to the use of VLs. A summary of these contrasting viewpoints is presented in Table 2 below. This comprehensive analysis allows us to understand the various perspectives and considerations surrounding the adoption of virtual labs in the educational context.

We love the reality and touching stuff
Because some experiments need face to face explain
I love the traditional learning more
It is better to see the experience in front of you
VLs does not make you understand everything and doesn't feel like actually experimenting
On site labs are more efficient and realistic
The experiment gives you the opportunity to try things physically
It's better to manipulate the materials
Sometimes VLs are not as concrete as the on-sites labs we prefer sometimes using the material, however if it is well explained virtual labs can be good too.
in face-to-face labs I can ask the professor a lot of questions and understand more
I love to do things by my hands
Traditional LAB shows us how the formula does work, and it make the subject more understandable.
While VLs are useful, I still prefer to experience the real-world experience to effectively prepare myself for professional life.
It is better to manipulate the material and do the experiments
Having a real experience is better
I prefer physical since we take more time and put in more effort working on it
I like seeing concrete evidence of an experiment
Physically we may ask the professor and understand more
I like hands on practice
Just a preference
Onsite labs are better in reality
Both are good but real-life labs are better seen
VLs likt Einstein
In traditional labs you can interact with the materials and understand the real physical phenomena
It always far better to learn with something that is tangible, you get to understand better the component itself
Because nothing can replace handling equipment with own hands
No when you are on site You are able to understand the lab better and actually get to manipulate stuff

Table 2: students' response against the use of VLs.

Some Comments in the table above affirm the preference of some students for traditional labs over VLs, for them it's more efficient to understand.

Some comments gathered from student responses show that in addition to preferring traditional labs, a significant group of students prefer a combination of virtual labs (VL) and traditional physical experiences. This indicates that students recognize that integrating the two approaches can provide a well-rounded and complete learning experience that combines the benefits of virtual tools with the practical and tangible aspects of traditional labs. The preference for this hybrid approach suggests an openness to exploiting the strengths of both virtual and physical experiences in teaching.

Therefore, the adoption of a blended lab approach, which combines both virtual labs and traditional physical experiences, appears to align with the preferences and needs expressed by students. This blended approach integrates the benefits of virtual tools and hands-on experiences, offering a more versatile and comprehensive learning environment.

Conclusion

In contemporary STEM education, VLs play a pivotal role, offering students a useful, helpful, flexible, easy, and self-directed means to explore and experiment across various scientific disciplines.

Overall, VLs play a crucial role in STEM education by offering students a useful, helpful, flexible, easy, and self-directed means to explore and experiment across various scientific disciplines. As students increasingly embrace VLs (Estriegana et al., 2019), traditional laboratories persist in their importance, providing a tangible and immersive learning experience. Traditional labs create a distinctive environment for students to explore, experiment, and gain practical insights into scientific concepts. Consequently, a blended laboratory approach, integrating face-to-face and online instruction (Graham, C. R., 2006), emerges as a promising strategy for educational transformation (Means, B., et al., 2009). This approach delivers a comprehensive and flexible learning experience, combining the benefits of hands-on experimentation with the accessibility and innovation offered by digital tools. Virtual labs act as complements to on-site teaching (Gregory & Di Trapani, 2012).

Recent research further underscores the advantages of blended learning for students including flexibility, student engagement, and motivation (Antonelli et al., 2023; Sasidharakurup et al., 2015; Setiawan & Rosli, 2023; Yu & Wang, 2023). This compelling evidence positions blended learning as a contemporary educational approach poised to enhance the overall learning experience for students in STEM disciplines.

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Incorporating Media Literacy Into Foreign Language Classrooms to Advance Kazakh Students' Critical Communication Skills

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Abstract

This paper outlines the results of the study that surveyed whether incorporating media literacy into English as a second language teaching promotes Kazakh students' critical communication. We reflect on media literacy practices in language classrooms as modes of teaching that foster students' awareness of media content to recognise and resist fake news and disinformation. The present study investigates how the ability to access, understand, analyse, adjust, create, and communicate messages in various forms can best enhance Kazakh students' language awareness and critical communication. The results indicate that suggested pedagogical frameworks take students through all necessary stages, ideas, and assumptions about media content and structure, contributing to Kazakh students' critical communication development. Students demonstrate significant improvements in critical reading and listening, productive speaking and writing, and responding to the onslaught of media messages. They also acknowledge that media-oriented English language instruction created an environment to envisage real-life context and authentic language use.

Keywords: Classroom Activities, Media Literacy, Creative Communication, Critical Thinking, Language Teaching, Pedagogical Framework

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Introduction

One of the most significant goals of Kazakh Higher Education is to train specialists with a critical eye on ongoing global trends and challenges who can communicate effectively with compassion, mutual respect, responsibility, and equality in a diverse global society (Kuanysheva et al., 2019; Rydchenko et al., 2023; Akhmetova et al., 2023). Needs for effective communication include critical listening, creative cooperating, collaborative problem-solving, and responsible decision-making upon a massive flow of information (Yelubayeva & Mustafina, 2020; Berkinbayeva et al., 2023). Partnership for 21st-century Skills (2003) has declared media literacy (ML) as one of the vital skills present-day students need to live and work successfully. This declaration identified valued outcomes of ML in modern society and the need to incorporate it into education to foster students' awareness of media content in recognising and resisting fake news and disinformation. Critical scholars (Buckingham, 2003, 2015; Hobbs & McGee, 2014; Kellner & Share, 2019) counter that schooling is the first factor to undertake this problem of disparity in media use. Likewise, ML promotes the critical thinking skills necessary to understand and communicate complex issues facing modern society (Worsnop, 2004; Mihailidis, 2014). Other approaches consider that ML skills enable individuals to use media materials intelligently, scrutinise and evaluate their content, critically dissect media forms, investigate effects, and create alternative media messages (MM) in various forms (Kellner & Share, 2005; Potter, 2013). Using social media, Facebook, particularly, supports peer learning, student engagement, and collaborative and contextualised learning (Kelly, 2018). Media literate specialists become intelligent consumers of products and information by comprehending and identifying the influence and meaning behind MM (Jenkins et al., 2009; Cheung & Chau, 2017).

By viewing the media as a tool for teaching critical communication purposes, it is significant to enable students to delineate 'reliable' from 'unreliable' content (Jenkins et al., 2009), create ways to maintain identities and construct discourse and community (Thorne, 2009) as well as inoculate participants against the harmful effects of media and explore the fluid nature of meaning in media texts (Hobbs & McGee, 2014; Potter, 2010). Thus, teachers need to be able to design adequate media-oriented classroom instructions that encourage students to think critically about MM before they comprehend, manipulate, or create their content in a target language.

ML is in its infancy in the Kazakh education system, so it needs pedagogical solutions to equip teachers with the relevant teaching tools to address this gap. The increasing role of media in consuming and producing new knowledge urges not only the introduction of media education in schools but also the designing of a 'critical' pedagogy to implement it.

This paper describes our attempts to incorporate ML into language learning and teaching (LLT). These attempts aim to understand better how the abilities to access, understand, analyse, evaluate, create, and communicate messages in various formats enhance students' language awareness and meaningful communication. Language instructions designed within the proposed framework create an environment to envisage real-life context and media resources to complete tasks aligned with their goals. This idea is proposed to ensure educators can access up-to-date teaching resources that keep pace with global trends (Kung, 2016; Fedorov & Mikhaleva, 2020). Many teachers use social media but typically do not create or share messages or incorporate media content into their lessons. This is due to their attitudes towards media, not because they lack technical skills.

We design media-oriented language classroom activities that teach students to decode MM, identify facts versus opinions, assess the influence of those messages on thoughts, feelings, and behaviours, create their messages thoughtfully, and communicate them accurately within their content. The paper outlines the results of a study that surveyed whether incorporating ML into LLT may promote Kazakh students' communication skills. Results lend themselves to exploring some critical questions for ML in language education:

1. What pedagogical framework takes students through the necessary stages, ideas, and assumptions about media content and structure in LLT?
2. What are students' perceptions of mastering ML for promoting activities to improve language skills?

Literature Review

Media Literacy has been defined variously at different times. However, it is commonly understood as a set of skills that enable people to browse, access, analyse, and evaluate images, sounds, and messages and create new ones in spoken and written communications. The ability to use the media content critically, responsibly, creatively, and in a socialised way is crucial to becoming informed and educated adults. ML seeks to offer media consumers the ability to understand the role of media in society and develop significant skills of inquiry and self-expression necessary for all citizens (Hobbs, 2018; Thoman, 1999; Jenkins, 2006). Buckingham (2003) defines ML as the knowledge, skills, and competencies essential to use and interpret media content. Potter (2013) interprets ML as a set of perspectives individuals use to interpret the meaning of MM. He believes individuals need mindful and critical media consumption to participate adequately in public life and contribute to the public discourse. The US National Association of Media Literacy Education defines ML as a capacity to access, analyse, evaluate, create, and act as a critical thinker, effective communicator, and active citizen using all forms of communication. It does not mean that all media consumers are already 'incredibly' capable and critical (Reyna et al., 2018). It can be accepted that audiences can be active and indeed 'critical' until they realise that there are things that they generally do not know about media but want to learn (Buckingham, 2015). All scholars and documents accept that deepening people's critical abilities broadens their understanding and awareness of what is happening around them and probably what will happen soon. We, therefore, contend that ML encourages students to be informed, engaged, and empowered to think critically while making decisions about message consumption and/or content production.

The need to enhance Kazakh students' critical awareness within LLT is urged because current National Education Standards are based on the designers' separate learning theories and goals without incorporating the socio-cultural content (Fedorov & Levitskaya, 2019; Yelubayeva et al., 2023). Now more than ever, there is a vital need for mechanisms to help students navigate high rates of media space and facilitate their own 'sense of self' along the way. There have been several attempts to structure the implementation of ML to education standards (Thoman & Jolls, 2004; Cope & Kalantzis, 2009; Mihailidis, 2014). The CML MediaLit Kit proposed a framework that boosts students' knowledge of current media content, practising applying that knowledge to new situations, analysing information, and communicating in a diverse global media culture. These skills include *Access* (ability to collect valuable information and comprehend its meaning); *Analyse* (ability to examine the form, structure, and sequence of the message); *Evaluate* (ability to relate messages to their own experience and make judgments about their quality and relevance); and *Create* (ability

to "write" their ideas and use of various communication technologies to create, edit and disseminate their message (Thoman & Jolls, 2004).

Mihailidis (2014) suggests the 5 A's framework: *Access* to media, *Awareness* of media power, *Assessment* of how media covers international and supranational issues, *Appreciation* for media's role in creating civil societies, and *Action* to encourage better communication across cultural, social, and political problems. This framework is developed to assist young learners in understanding their role as global citizens, respecting and valuing diversity, understanding how the world works in diverse contexts, contributing to communities to make the world a better place to live, and taking responsibility for their actions.

Both frameworks comprehensively structure classroom activities to implement ML in education. *In terms of LLT, a more tangible and meaningful approach to mastering learners' metacognitive skills is needed. This approach should reflect thoroughly on the realities of media content, exploring how words, issues, and ideas are formed, function, and are related across contexts.*

Table 1: Communication and Media Literacy

Learning Objectives: Training Critical Thinkers and Effective Communicators					
Learning Skills					
Lexical Skills		Language Skills		Communication & Media Skills	
Competencies					
Accessing	Detecting	Analysing	Adjusting	Creating	Communicating
Student-centred Teaching Methods					
Case-based learning	Inquiry-Based Learning	Problem-Based Learning	Project-Based Learning	Collaborative learning	
Learning Instructions					
Content-based		Technology-based		Competency-Based	
Resources					
Audio & visual materials		Print materials		Internet resources	
Learning outcomes					
1) evaluating the reliability of information obtained from various sources, 2) conveying a message through various forms of media with accuracy, clarity, and creativity, 3) encouraging students to compare different perspectives in media texts, 4) engaging students in research and critical thinking, 5) fostering students' collaborative autonomous learning abilities, 6) mastering students' proficiency in communicating and disseminating their thoughts and ideas, 7) acknowledging the values and perspectives embedded in the plot and 8) encouraging students' interest in various global and local issues.					

Considering the results of prior theoretical and empirical research, we propose a framework that takes students through all the necessary stages, ideas, and assumptions about media content and structure with which to empower their critical communication. *By critical communication, we mean the attainment of competence that fosters a critical understanding of how communication functions in different contexts by identifying key concepts, connecting multiple ideas, adapting messages to situations and audiences, and creating messages with compassion and mutual respect.* The Communication and Media Literacy (CML) Model is a pedagogical framework for organising and structuring classroom activities that create educational environments for applying theoretical concepts to tackle real, tangible issues, demonstrating the complexity and unpredictability of actual issues (Table 1). The CML framework can develop students' critical thinking and communication skills.

Bringing mass-mediated materials to LLT environments through well-organised and structured teaching models may be more effective and engaging than education focused solely on exposing media manipulation to bridge the gap between the students' classroom and real-life experiences with the media (Gee, 2009; Hattani, 2016). This approach encourages students to be aware of the choices they make in their life and career and how they fit into a greater societal context. Hence, integrated media and LLT classrooms are good environments for students to be exposed to natural language, extract accurate information from actual text, and react to trends and challenges like L1 speakers do.

Methodology

Practical Applications of ML for Language Instruction

This section aims to provide examples of practical applications of ML in LLT. This application can be significantly enhanced if it is contextualised within task-based activities. For this purpose, we designed a set of task-based activities within the comprehensive CML model that foster the abilities listed below:
- assessing the credibility of information from different sources,
- being aware of and appreciating diverse cultural perspectives,
- communicating accurately, clearly, and creatively using different forms of media,
- encouraging students to compare different perspectives in media texts,
- engaging students in research and critical thinking,
- fostering students' collaborative autonomous learning abilities,
- mastering students' proficiency in communicating and disseminating their thoughts and ideas,
- recognising values and points of view embedded in the plot and
- stimulating students' interest in various global and local issues.

These activities include instructions for reading, listening/viewing specific MM, and then reflecting on them by analysing questions. The advantage of devising teaching activities based on media products is that one can vary the degree of difficulty if you have to deal with diverse language proficiency levels within the same group of students (Yelubayeva et al., 2023). Practical applications at every stage are described in the following paragraphs.

Accessing and Detecting Messages

Access to various media products further to inform, engage, and provide varied viewpoints is the initial stage in facilitating, sharing, and expressing communication needs. Therefore, classroom instructions for accessing should be targeted at defining the source of information, obstacles to access, and how media technologies and platforms influence the accessibility of information. Classroom instructions for critically *Detecting* how messages are constructed to carry a specific message for a specific audience by recognising vocabulary, symbols, and information techniques should foster abilities to provide context, reflect values, develop ideology, and cultivate representation. These activities enable students to consider the origins of information and to define the prevalence of information in society.

Analysing and Adjusting Messages

Classroom activities that enable students to *Analyse* the design of the message's form, structure, and sequence include tasks for identifying the way messages are constructed in order to build meaning, examining consumers' interpretation of the messages using compare/contrast, fact/opinion, cause/effect, listing and sequencing strategies, deconstructing the physical attributes of messages used to develop a specific meaning or reinforce an idea and others. Message *Adjusting* is implemented by relating it to the evaluator's experience and judging its accuracy, quality, and significance to develop a specific meaning or reinforce an idea. Language instruction improves students' ability to evaluate message quality and judge value based on principles.

Creating and Communicating Messages

The task instructions for *Creating* MM address cultivating critical thinking skills and creating opportunities for enhanced dialogue that can lead to more diverse and varying viewpoints. These tasks foster abilities to use brainstorming, planning, composing, and revision processes, to use written and spoken language effectively and accurately and to use various types of communication technologies in constructing messages. Depending on the level, teachers can ask students to create presentations, videos, articles, or social campaign posters. *Communication* involves transferring messages effectively for various purposes and audiences. There is some evidence to prove that many students fail to communicate their ideas or points of view for various reasons. Enabling students to communicate ideas and information actively supports social participation, campaigns, and active citizenship.

Participants

Six groups (*n = 88*) of first-year master students in History and Archeology at al-Farabi Kazakh National University participated in the study. All participants were twenty-three and twenty-four years old. The goal was to study first-year graduate students mainly because it is a critical age in the education system when their self-esteem, self-expression, and self-image are gradually reinforced. The History groups *(n = 45)* were determined as the control groups (CG), and the Archeology groups *(n = 43)* were determined as the treatment groups (TG). The selection of Archeology groups as TG was based on the fact that the students from these groups were less active in sessions of questioning, answering, and discussion during learning before the experiment. In addition, the academic performance of these groups was lower than in CG, and we decided to attempt to raise these students' learning outcomes experimentally. During the experiment, the TG tested the application of ML to language learning based on the CML Model, whereas the CG was provided with the application of conventional learning.

Results

This study explored language proficiency pre-test, post-test, delayed post-test, a questionnaire, an interview and panel discussions with students to measure the effectiveness of the CML model in the media-incorporated language classroom and reply to the study research questions. The language proficiency test consisted of Writing (reading, listening and article critique) and Speaking parts. Articles came from news networking platforms such as BBC Global News (bbcglobalnews.com), The Guardian (https://www.theguardian.com), and Euronews (euronews.com), among others. The student's analysis of the text plot, key message, or character was followed by a contextual discussion and critical view during the

Speaking part. The tests were identical in scope and format and did not differ. The test validity was assessed by PhD language instructors teaching English for more than ten years. Pearson's correlations (Pearson's r) were used to calculate the interrater reliability, and the obtained coefficient ($r=80$) was confirmed to ensure the agreement between instructors.

The first step in performing a one-way MANOVA is to quantitatively compare the language proficiency of CG and TG students across four components: reading, listening, writing, and speaking. MANOVA results show that the two groups were homogeneous − without significant multivariate and univariate differences in English language proficiency level before receiving treatment sessions (Figure 1). Figure 1 demonstrates the results of the pre-test and post-test.
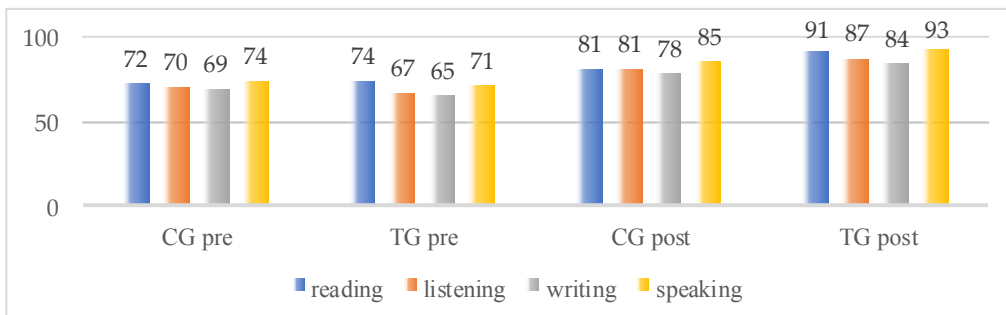
Figure 1: Pre- and post-experiment English Proficiency Test Results in CG and TG

The pre-test was held in the first week of the twelve-week treatment session (Spring Semester 2022), and in the last week of the treatment session, students had a post-test.

Following the language proficiency post-test, the students had a questionnaire. For this, the Satisfaction with Life Scale (SWLS) was employed to judge students' satisfaction with the introduction of ML in EL Classrooms. The scale contained four statements: (1) ML increases students' interest in learning English; (2) ML practice involves mastering four language skills (reading, listening, writing, and speaking); (3) Media products make English content more meaningful and flexible; (4) Media products master critical awareness. The participants were asked to indicate their level of agreement with a statement on a seven-point Likert scale (from 7 = 'strongly agree' to 1 = 'strongly disagree'). Total scores ranged from 1 to 35, where the lowest score indicates the respondent's *Extreme Dissatisfaction* (scores between 5-9), scores ranging from 10 to 14 indicate *Dissatisfaction*, 19-19 indicate *Slight Dissatisfaction*, 20 indicate *Neutral* position, 21-25 indicate *Slight Satisfaction*, 26-30 indicate *Satisfaction* and 31-35 indicate *Extreme Satisfaction*. The questionnaire results are given in Figure 2.
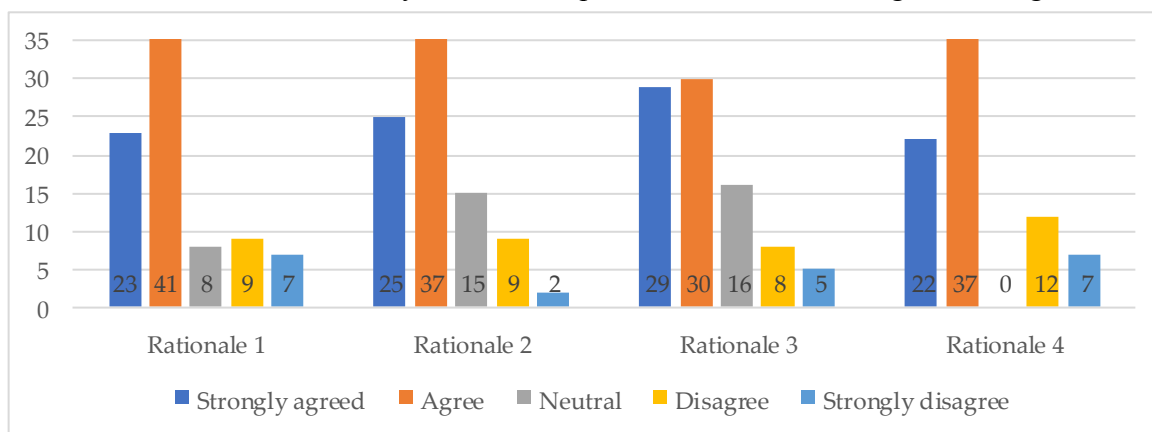
Figure 2: Students' Satisfaction with Introducing ML in EL Classrooms

The follow-up interview was conducted voluntarily. Twenty-one out of eighty-eight respondents attended a follow-up interview to interpret their answers to the questionnaire. About three-quarters of the respondents (73%) agreed that implementing ML education in English instruction fosters motivation for studying English. When students are instructed to apply their media experiences in educational settings, they are more motivated to master the language competency (Bates, 2019). 71% of the respondents indicated that ML education is closely related to teaching the four language skills. The Interviewees claimed it was natural for ML to be implemented in English lessons as they listened to different records/videos, read posts and articles, wrote messages/essays/emails, and commented/discussed various issues. Its meaningful and flexible content is another central argument for implementing ML in English classrooms. 67% of the respondents claimed that English teaching content is flexible for students' abilities and interests. 67% of the respondents approve that ML practice implies the students' broad erudition and capacities to analyse and synthesise various issues in MM. Active use of methods to analyse and structure the information independently, check the facts, and reach valid conclusions promotes students' cognitive activity and develops critical thinking. Respondents' generalised attitudes towards surveys demonstrate their willingness and readiness to participate in the experiment. They believe the experiment can substantially affect the quality of LLT and academic achievements.

Two weeks later, a face-to-face panel discussion was held after treatment sessions. The panel aimed to identify students' perceptions of the effectiveness of incorporating ML into their language learning. The analysis reveals positive dynamics in the answers to the questions:
1. *Do you feel your English has improved within media-oriented language classrooms?*
2. *Why is critical thinking important in language learning?*
3. *What is the impact of ML on language education?*

Participants found the sessions in the experiment satisfying. They confirmed the positive effect of language and ML incorporation in developing their receptive and productive skills. They stated that they had achieved higher reading, listening, and writing achievement scores than they had before. Most participants claimed that during experimental learning with media texts, they learned language faster, and they could express their ideas and views clearly, confidently, and meaningfully in communication as they came across real-life situations and real-time language used beyond the classroom. Another rationale for the efficiency of the experiment that students indicated was the ability to discover values and ideas embedded in MM, critically interpret them, and decide whether to accept or reject them.

Furthermore, they mentioned that during the experiment, they could explore new areas of their job and seek knowledge, clarification, and new solutions for raised problems, evaluate statements and arguments, and distinguish between facts and opinions creatively and critically. They were willing to examine their beliefs and admit a lack of knowledge or understanding when needed, showing humility. Perhaps most of all, they highlighted the relevance of the communication and social skills gained from the experience to their future professional needs, which create a positive environment to promote their understanding of the world by filtering the MM for distortions and bias issues of particular interest to them.

Overall, participants reflected positively on using media materials in LLT. Regarding the effectiveness and feasibility of the CML Model, it served as an efficient means to measure media literate communication skills when testing students. Most participants (85%) found the CML Model incorporated language and ML effectively, and 79% of the respondents declared

the feasibility of task-based assignments, whereas 21% found the tasks infeasible. Figure 3 reports the results of the students' perception of the CML Model.
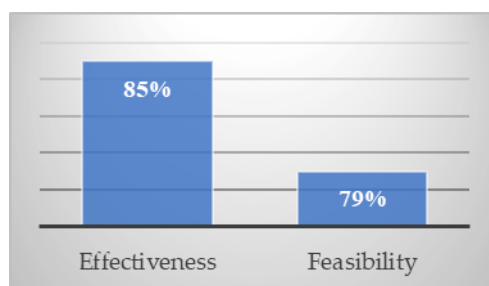
Figure 3: Students' Perception of the CML Framework

Discussion and Conclusion

Further talks on the CML Model feasibility figured out factors that had contributed to the failure in the task accomplishment. The first factor for failure was poor communication. We discovered that some students needed to establish a positive communication channel. They concurred that their confidence increased over time, and their initial anxiety decreased as they got to know their peers and focused on understanding one another. This led to the teachers' decision to establish a task management system that enables smooth communication. The second is low language proficiency. Despite the group demonstrating an overall pre-intermediate Kazakh proficiency level, there were poor Kazakh students. Thus, we concluded that classroom activities still need to be adjusted for students' needs individually, and third was poor monitoring. During the experiment, we realised that assigning roles to all team members is insufficient; teachers should monitor progress regularly and appoint team members responsible for their actions. Once they feel responsible for their actions, they will perform better and demonstrate better results.

This paper attempts to justify that if students are guided to see, read, and listen beyond what is presented to them lexically and grammatically, they can become independent and critical thinkers. In this study, we found confirmation of our findings on the interrelation between ML and language proficiency, which results in students' academic success. They were able to gain access to various media formats and technologies to facilitate information to create, share, and communicate messages; analyse how messages are constructed to carry a specific message for a target audience; assess information extracted from the text; demonstrate high levels of critical judgment, interpretation skills; demonstrate greater mutual understanding, recognition of diversity in multicultural and multilingual societies and respect for such diversities; communicate effectively contextual information and critical perspectives extracted from a text. These skills led to significant improvements in critical thinking and creative written and spoken communication.

One of the challenges for students in applying critical and creative communication to their actions is fear that they might be left to encounter a cynical and defeatist judgment or opinion in response. This fear must be eliminated in the classroom by constant practice rather than being solved with quick tips. Thus, task-based instructions based on the CML Model call students for discussion and critical view to enhance their communication skills and critical thinking and promote social awareness and engagement.

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Thinking Aloud Protocol Based Self-Report Questionnaire to Measure Metacognitive Skills in Mathematical Problem Solving

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Abstract

Metacognitive skills play a major role in Mathematical problem solving. Metacognitive skills are required for monitoring and regulating the cognitive process of Mathematical problem solving. Different countries have declared that improving metacognitive skills is an essential component in Mathematics Education. Hence, having an instrument to effectively and efficiently measure metacognitive skills is important for both researchers and teachers. Think-aloud protocol is an endorsed method for assessing metacognitive skills in Mathematics. There, students verbalize their thoughts while working on the problem. However, this method has limited usability in large classroom settings due to the time consumed. Self-report questionnaires, on the other hand is an efficient metacognitive skill measurement instrument since it has ease of administration, suitable for larger classes and no need of special training on conducting. Though task general self-report questionnaires show low correlation with think-aloud which is an effective metacognition measurement tool, task specific questionnaires which were designed in line with think aloud show a significant correlation. To this date, there is no self-report questionnaire designed based on think-aloud for measuring metacognition in Mathematical problem solving. This study focuses on developing a task specific Likert type questionnaire for measuring metacognitive skills in Mathematical problem solving based on think aloud. The scale shows a high content validity (S-CVI/Ave=0.9), confirms the construct validity including both convergent and discriminant and higher internal consistency (ordinal alpha=0.89) assuring it as a successful measure for measuring metacognitive skills in Mathematical problem solving.

Keywords: Mathematical Problem Solving, Metacognition, Metacognitive Skills, Questionnaire, Thinking Aloud Protocol

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Introduction

Measuring metacognition is still debatable because it is a complex structure which is not visible from the outside. It is a process that happens inside the brain. There are currently various types of measurements used to assess metacognition. Questionnaires and interviews are offline measures while Think Aloud Protocol and systematical observations are online measures. This research specifically focuses on measuring the metacognition of students who learn in Digital Learning Environment (DLE). In DLEs, conducting Thinking Aloud or systematical observations may be impractical due to large number of students. These methods are individual-based and require more time for transcribing and analyzing students' language into a common coding system (Veenman & van Cleef, 2019). Different coding systems may create different results. Think Aloud Protocol has to be conducted by trained raters using well developed coding systems (Schellings et al., 2013). Quality of the online assessment depends on the adequacy of the coding system (Schellings et al., 2013). Further, there may be unrevealed thought processes even during think aloud tasks since students may not verbalize, all they think.

But many pieces of research confirm that online measures are the most effective method of assessing metacognition, especially in Mathematical problem solving (Veenman & van Cleef, 2019). Veenman and colleagues confirmed that self-report questionnaires exhibit a moderate relationship with the online Think Aloud method (Veenman & van Cleef, 2019). Veenman suggested that, for the assessment of metacognitive skills in Mathematics, online methods should be preferred over offline methods (Veenman & van Cleef, 2019). However, there are still numerous challenges in conducting the Thinking Aloud Protocol for larger classes. Schellings and colleagues concluded that the Thinking Aloud method is particularly suitable for research purposes rather than for practical aims due to its labor-intensive process (Schellings et al., 2013).

Hence, using the Think Aloud method for measuring metacognition in DLEs is not very practical due to large class sizes. However, there is still a possibility of creating a questionnaire based on the Thinking Aloud method. However, correlations between questionnaire data and think aloud measures are generally moderate to low (Schellings et al., 2013). When questionnaires are compared with Think Aloud, they present a varied picture. Researchers have found that general questionnaires exhibit a low correlation (0.22) with Think Aloud, whereas task specific questionnaires show moderately high (0.42) correlation (Schellings et al., 2013). Since questionnaires inquire about the activities that students performed, they rely on the long term memory. At times, questionnaires may not accurately represent the actual activities performed by students due to the limitations of memory (Schellings et al., 2013). Responses to the questionnaires may be influenced by varying reference points, such as comparing oneself with others, like the teacher or the best/worst student in the class. This also contributes to the low correspondence of the questionnaire. Even though students are using more strategic activities, they have to limit to the questionnaire given. Students report more activities to be effective not because they use them, but because they believe they are effective. Variations in rating the activities in questionnaires and Think Aloud create non-correspondence between the two. As an example, since Think Aloud uses a frequency scale, questionnaires measuring the usefulness of activities do not exhibit a high relationship (Schellings et al., 2013). Due to these reasons, self-report questionnaires and Thinking Aloud protocol suffer from low correlations.

Schellings and colleagues (2013) designed a questionnaire for measuring metacognition in reading activities based on taxonomy for coding Thinking Aloud protocols. Despite some validity issues with that scale, it showed a promising correlation (r=0.63) with Thinking Aloud. There is no such domain specific questionnaire built for Mathematical problem solving based on Thinking Aloud. In this present study, questionnaire was designed based on scoring system created by Veenman and colleagues (2000;2005) for systematical observations used in Thinking Aloud in Mathematical problem solving.

The objective of this research is to design a task-specific questionnaire aligned with thinking aloud in order to minimize administrative and time consuming issues while extracting maximum information comparable to an online measure. For Mathematical problem solving, no task specific questionnaire has been designed based on Thinking Aloud. If a task-specific questionnaire can be designed that closely measures metacognition skills, such as Thinking Aloud Protocol, this scale could be a successful alternative for Thinking Aloud Protocol.

Next sections will describe how the questionnaire was designed and how validity and reliability were tested for the designed questionnaire.

Methodology

Questionnaire Design

This questionnaire is aligned with systematical observations used in Thinking Aloud Protocol. Thinking Aloud Protocol is an online measure while questionnaire is an offline measure where students report what they do/have done. This self-report questionnaire contains the questions to measure the metacognitive skills in Mathematical problem solving.

Systematical observations during problem solving process were used to create the questions in the questionnaire (Veenman et al., 2005). That systematical observation process includes 15 activities which were used to evaluate students while they are thinking aloud. These 15 activities were designed and tested by Veenman (Jacobse & Harskamp, 2012; Veenman et al., 2000, 2005). Table no 1 shows the 16 questions designed in line with systematical observations in Thinking Aloud protocol.

From this self-report questionnaire, it is intended to measure how frequent, the student is applying metacognitive activities in Mathematical problem solving process. A three-point scale was used to score the items. A frequency scale was used, since Thinking Aloud is also measuring a frequency. The scale was same as the scale used by Schellings (Schellings et al., 2013). Respondents select an answer from three scales "almost never" (=1), "Sometimes" (=2) or "often" (=3). There are few reasons to select a three-point scale for the responses.

1. Due to the task-specific nature of the questionnaire's elements, it may be challenging for the respondents to distinguish between small distinctions between "often" and "very often" on a more complicated scale (Schellings et al., 2013).
2. Student's perception on the task they performed, are represented in self-reports. When they select an answer, they may use some reference points (their own individual standard, view point of their teacher, standards related to an ideal student or poor student). Therefore students who use one reference point may have a consistent reference point (Schellings et al., 2013).

3. A three-point scale may reduce the variation among students' choices of a reference point even though it cannot be fully eliminated (Schellings et al., 2013). This will produce high reliability and stability in the questionnaire.

After the design process, next step was the questionnaire validation and finding the reliability to ensure that how well the data is representative of the subject under examination and how well it provides stable and consistent results (Taherdoost, 2016).

	Activities Recommended (Jacobse & Harskamp, 2012; Veenman et al., 2000, 2005)	Question Included to verify the activity
1	entirely reading the problem statement (Planning)	1. I read the question entirely, before I start the solving process.
2	selection of relevant data (Planning)	2. I select/highlight all the relevant data from the question before starting the solving process.
3	paraphrasing of what was asked for(Planning)	3. I paraphrase the question. 4. I make clear what I have to find before starting the solving process
4	making a drawing related to the problem (Planning)	5. I usually draw a sketch related to the problem, before I start the solving process.
5	estimating a possible outcome (Planning)	6. Before I solve the problem, I estimate/think about the nature of the possible solution that I would get.
6	designing an action plan before actually calculating (Planning)	7. I usually design a plan (temporary) to solve the problem
7	systematically carrying out such plan (Monitoring)	8.Every time I execute the designed plan systematically to reach the answer.
8	calculation correctness (Monitoring)	9. I am always vigilant on the calculation process to verify that I am on the correct way to the solution.
9	avoiding negligent mistakes (Monitoring)	10. I pay attention to avoid negligent mistakes during the solving process.
10	orderly note-taking of problem solving steps (Monitoring)	11. I keep an eye on the problem solving steps which helps me to verify intermediate results.
11	monitoring the on-going process; (Monitoring)	12. I always monitor the ongoing calculation process.
12	checking the answer (Evaluation)	13. I check whether the final answer is acceptable and compatible with given data.
13	drawing a conclusion (Evaluation)	14. I confirm that the final answer is correct.

14	reflecting on the answer (Evaluation)	15. I refer the final answer to the problem statement and verify that the answer is acceptable.
15	relating to earlier problems solved (Evaluation)	16. I relate to similar problems solved earlier and reflect the accuracy of the answer.

Table 1: Initial questions included in the questionnaire

Questionnaire Validation and Reliability

To validate the questionnaire, content validation and construct validation were used. Internal consistency was calculated for reliability analysis.

Sample Selection for Validation and Reliability

Students were classified according to their field of study(strata). To have 95% confidence interval with 5% margin of error, ideal sample size for 800 populations is 260. Table 2 represents how 260 students were selected proportionately from each discipline. Specific student from each discipline was selected randomly using a random number generator. In this sample 33% are females and 67% are males.

Discipline (Strata)	Total Population	No of students from each strata
Chemical Engineering Technology	50	16
Civil Engineering Technology	200	65
Electronic Engineering Technology	100	33
Electrical Engineering Technology	100	33
Information Technology	100	33
Maritime Engineering Technology	20	6
Nautical Studies	20	6
Mechanical Engineering Technology	100	33
Polymer Engineering Technology	50	16
Textile Engineering Technology	60	19
Total	**800**	**260**

Table 2: Sample Selection Details

Content Validation

In general, content validity requires assessing a new survey instrument to make sure it has all the necessary items and omits any which are unimportant to a specific concept area (Taherdoost, 2016). In content validation, a survey is conducted to get the idea of the experts in the same field of research. Content validation questionnaire was distributed among one Advanced Level Mathematics Teacher, four Mathematics lecturers from higher education institutes (public and private) in Sri Lanka and two researchers from the field of Mathematics Education. According to the answers of those 7 experts, Content Validation Index (CVI) was calculated.

Construct Validation

Construct validity refers to how well a concept, idea or behavior was operationalized into a working, operable reality (Taherdoost, 2016). To measure the construct validity, the questionnaire was distributed among selected 260 diploma students from 1st Semester who follow IS1104 Mathematics and Statistics in Institute of Technology University of Moratuwa. The questionnaire was distributed as soon as the students finished a Mathematical problem solving exercise. After removing incomplete responses, only 200(77%) responses were used for finding two forms of construct validity; convergent and discriminant.

Convergent Validity

In convergent validity, it is studied that two measures of constructs that are theoretically related are, in fact related (Taherdoost, 2016). To validate the questionnaire, the Cognitive and Metacognitive Strategies section (30 questions) of the Motivated Strategies for Learning Questionnaire (MSLQ) was employed. Using Statistical Package for Social Sciences (SPSS) software, correlation was calculated between two questionnaires using Spearman's rho correlation analysis. If the newly designed questionnaire is convergent valid, it should exhibit a significant correlation with the MSLQ – Cognitive and Metacognitive Strategies questionnaire.

Discriminant Validity

In discriminant validity, it tests whether constructs that are not related are in fact not related (Taherdoost, 2016). The questionnaire designed and the questions on Test Anxiety in the MSLQ, which are theoretically unrelated, were subjected to correlation testing using Spearman's rho correlation analysis. If the newly designed questionnaire has discriminant validity it should not show any significant relationship with responses from MSLQ-Test Anxiety questionnaire.

Reliability Analysis

In the reliability analysis, internal consistency was assessed by calculating Cronbach's alpha from the data collected within the same sample.

Results

Content Validity

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Experts in agreement	I-CVI	UA
Q1	1	1	1	1	1	1	1	7	1	1
Q2	1	1	0	1	1	1	1	6	0.86	0
Q3	1	1	1	0	1	1	0	5	0.71	0
Q4	1	1	1	1	1	1	0	6	0.86	0
Q5	1	0	1	1	1	1	1	6	0.86	0
Q6	1	1	1	0	1	1	1	6	0.86	0
Q7	1	1	1	1	1	1	1	7	1	1
Q8	1	1	1	0	0	1	0	4	0.57	0
Q9	1	1	1	0	1	1	0	5	0.71	0
Q10	1	1	1	1	1	1	1	7	1	1
Q11	1	1	1	1	1	1	1	7	1	1
Q12	1	1	1	1	1	1	1	7	1	1
Q13	1	1	1	1	1	1	1	7	1	1
Q14	1	1	1	1	1	1	1	7	1	1
Q15	1	1	1	1	1	1	0	6	0.86	0
Q16	1	1	1	0	1	1	1	6	0.86	0
								S-CVI/Ave	0.88	
Proportion Relevance	1	0.94	0.94	0.68	0.94	1	0.68	S-CVI/UA		0.44
	Average proportion of items judged as relevance across 7 experts					0.88				

To measure the content validity of the questionnaire Content Validation Index (CVI) was calculated (Yusoff, 2019). Table 3 presents the calculation of CVI.

Table 3: Content Validation Index (CVI) Calculation

There three important CVI indices (Yusoff, 2019)
1. I-CVI (Item level content validity index)
2. S-CVI (scale-level content validity index based on the average method)
3. S-CVI/UA (scale-level content validity index based on the universal agreement method)

According to Lynn (Lynn, 1986; Yusoff, 2019), for 7 experts, minimum acceptable CVI value is 0.83. Except questions 3, 8 and 9 in designed questionnaire, all other questions are satisfying this minimum threshold value for I-CVI. S-CVI/Ave value is 0.88 and it also satisfy the minimum threshold value of 0.83. But S-CVI/UA is 0.44 and it does not satisfy the minimum requirement.

Construct Validity

For this, Convergent validity and Discriminant validity was calculated using Spearman's rho.

Convergent Validity

Table 4 shows the results of correlation analysis for convergent validity.

Correlations			New Questionnaire	Metacognitive and Cognitive Component of MSLQ
Spearman's rho	New Questionnaire	Correlation Coefficient	1.000	.288**
		Sig. (2-tailed)	.	.000
		N	200	200
	Metacognitive and Cognitive Component of MSLQ	Correlation Coefficient	.288**	1.000
		Sig. (2-tailed)	.000	.
		N	200	200
**. Correlation is significant at the 0.01 level (2-tailed).				

Results show a significant correlation at the 0.01 level (2-tailed). Hence it can be concluded that new questionnaire shows a convergent validity with a same type of a questionnaire.

Table 4: Results for Convergent Validity

Discriminant Validity

Table 5 shows the results of correlation analysis of discriminant validity. There is no any significant correlation between the new questionnaire and test anxiety component of MSLQ. Hence it doesn't show any relationship with Test Anxiety. These results ensure the discriminant validity.

Correlations			New Questionnaire	Test Anxiety component of MSLQ
Spearman's rho	New Questionnaire	Correlation Coefficient	1.000	.085
		Sig. (2-tailed)	.	.232
		N	200	200
	Test Anxiety component of MSLQ	Correlation Coefficient	.085	1.000
		Sig. (2-tailed)	.232	.
		N	200	200

Table 5: Results of Discriminant Validity

Reliability Analysis-Cronbach's Alpha

For evaluating the reliability, internal consistency was considered. For calculating internal consistency, Cronbach's alpha was calculated using SPSS (Table 6) (Schellings et al., 2013).

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.546	0.545	16

Table 6: Reliability Statistics

It seems that Cronbach's alpha (Table 6) is a low value ($0.5 < \alpha < 0.6$) and this will interpret low internal consistency in the newly designed questionnaire. The reasons for low Cronbach's alpha value should be investigated for improving the internal consistency and hence assuring that all items are measuring the same variable (metacognitive skills).

How Questionnaire was Updated for High Validity and Reliability?

If the Cronbach's alpha is applied to a scale for calculating the reliability, three assumptions should be satisfied(McNeish, 2018). They are,
1. The scale items should be continuous and normally distributed.
2. The scale should adhere tau equivalence.
3. The errors of the items do not covary.

The observed covariance (or correlations) between items forms the foundation for a major part of Cronbach's alpha (McNeish, 2018). These item covariance is calculated using Pearson Correlation Analysis (PCA). It is well known that all variables in Pearson Correlation matrices are continuous in nature (McNeish, 2018). The scale described above is a Likert type questionnaire which contains discrete values. Hence, first assumption is violated.

By checking tau equivalence, it is assured that each item on the scale contributes equally to the total scale score (McNeish, 2018). To verify tau equivalence, exploratory factor analysis is run on the scale to verify that items have same relationship to underlying construct. For the scale developed above, exploratory factor analysis was run using SPSS.

Factor Analysis

This questionnaire is designed to measure the metacognitive skills in Mathematical problem solving. Metacognitive skills are composed with three components; planning, monitoring and evaluation. Questions in the questionnaire are designed to measure these three components. The questions are organized as follows. Q1, Q2, Q3, Q4, Q5, Q6 and Q7are designed to measure planning skills, Q8, Q9, Q10, Q11 and Q12 are designed to measure monitoring skills and Q13, Q14, Q15 and Q16 are designed to measure evaluation skills. Table 7 presents the groups of questions that are initially assumed to be in three groups. Hence, it is assumed that factor analysis of this questionnaire should lie within three factors/groups.

Planning
PL1.I read the question entirely, before I start the solving process.
PL2.I select/highlight all the relevant data from the question before starting the solving process.
PL3. I summarize the question and identify the main points.
PL4. I make clear what I have to find before starting the solving process
PL5. I usually draw a sketch related to the problem, before I start the solving process.
PL6. Before I solve the problem, I estimate/think about the nature of the possible solution that I would get.
PL7. I usually design a plan (temporary) to solve the problem
Monitoring
MO1.Every time I execute the designed plan systematically to reach the answer.
MO2. I am always vigilant on the calculation process to verify that I am on the correct way to the solution.
MO3. I pay attention to avoid negligent mistakes during the solving process.
MO4. I keep an eye on the problem solving steps which helps me to verify intermediate results.
MO5. I always monitor the ongoing calculation process.
Evaluation
EV1. I check whether the final answer is acceptable and compatible with given data.
EV2. I confirm that the final answer is correct.
EV3. I refer the final answer to the problem statement and verify that the answer is acceptable.
EV4. I relate to similar problems solved earlier and reflect the accuracy of the answer.

Table 7: How questions are assumed to be in groups.

Factor analysis for above mentioned groups were conducted in SPSS. Exploratory Factor Analysis (EFA) was conducted using a principal component analysis and varimax rotation. Using EFA, items with high correlations are grouped together. Minimum factor loading was set to 0.5.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO)		.559
Bartlett's Test of Sphericity	Approx. Chi-Square	230.035
	df	120
	Sig.	.000

Table 8: KMO and Bartlett's Test

Since KMO< 0.6, it indicates that it needs corrective actions (Shrestha, 2021). Bartlett's Test of Sphericity is highly significant at $p<0.001$ and it indicates that there are significant correlations among at least few variables in the matrix. It rejects the null hypothesis (H_0) that correlation matrix is an identity matrix. Since significant value is <0.05, variables are suitable for factor analysis (Shrestha, 2021).

Communality represents that the degree of variance a variable shares with all other variables being considered (Shrestha, 2021). For a sample size in between 100 and 200, communality value in between 0.5 and 0.6 is acceptable (Shrestha, 2021). Items which does not satisfy this requirement are removed. In Table 9, communality values of all 16 items in the questionnaire is represented. Question no 1 and 5 (MO1 and MO5) in Monitoring Skills group is not satisfying the criteria. Based on this, these two questions can be removed. But for further analysis, those two were kept as they are without removing in this very first step.

Table 10 demonstrates the eigenvalues and total variance. Extraction method used for factor analysis is principal component analysis. Before extraction, there were 16 factors. There are seven unique linear components in the data set with the eigenvalue > 1 after extraction and rotation. The portion of the total variance explained by a factor is indicated by its eigenvalue. The factors that have an eigenvalue greater than one are kept in factor analysis (Shrestha, 2021). The reasoning behind this rule makes sense. An eigenvalue larger than one is regarded as significant and denotes that the factor accounts for more of the common variance than the unique variance (Shrestha, 2021).

It is suggested that the retained components should account for at least 50% of the total variation. It reveals that 59.2% common variance shared by 16 variables is now sharing among seven variables. But this result is violating the initial decision of keeping all factors in three factor groups (planning, monitoring and evaluating). This is also indicated by initial KMO value (0.559) which indicated the need of corrective actions.

Table 11 represents the rotated component matrix with factor loading values for all seven factors. Factor loading values less than 0.5 are not displayed. Hence, items PL2, PL6, MO1 and MO5 does not include in any factor structure. Remaining items are scattered among seven factors and does not agree with three factor groups which was used for initial questionnaire design. Hence, factor analysis for this questionnaire is failed and it reveals the reason for low Cronbach's alpha value which created low internal consistency in the questionnaire.

Variables in this questionnaire are ordinal ("Almost never", "Sometimes", "Often") and discrete. It is recommended to use ordinal alpha for calculating internal consistency for ordinal type of data (Gadermann et al., 2012).

Communalities		
	Initial	Extraction
PL1	1.000	.527
PL2	1.000	.646
PL3	1.000	.670
PL4	1.000	.598
PL5	1.000	.578
PL6	1.000	.600
PL7	1.000	.650
MO1	1.000	.498
MO2	1.000	.543
MO3	1.000	.612
MO4	1.000	.570
MO5	1.000	.371
EV1	1.000	.670
EV2	1.000	.679
EV3	1.000	.595
EV4	1.000	.669
Extraction Method: Principal Component Analysis.		

Table 9: Communalities

Total Variance Explained									
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.084	13.023	13.023	2.084	13.023	13.023	1.482	9.263	9.263
2	1.659	10.369	23.392	1.659	10.369	23.392	1.427	8.921	18.184
3	1.259	7.871	31.263	1.259	7.871	31.263	1.386	8.662	26.846
4	1.227	7.671	38.934	1.227	7.671	38.934	1.352	8.449	35.294
5	1.154	7.212	46.146	1.154	7.212	46.146	1.302	8.139	43.434
6	1.089	6.807	52.953	1.089	6.807	52.953	1.298	8.110	51.544
7	1.003	6.270	59.223	1.003	6.270	59.223	1.229	7.679	59.223
8	.949	5.932	65.155						
9	.882	5.513	70.668						
10	.830	5.190	75.858						
11	.783	4.894	80.752						
12	.724	4.523	85.275						
13	.715	4.470	89.745						
14	.609	3.806	93.551						
15	.577	3.608	97.159						
16	.455	2.841	100.000						

Extraction Method: Principal Component Analysis.

Table 10: Eigenvalues and Total Variance Explained

According to the results obtained in factor analysis, questionnaire was updated by removing items PL2, PL6, MO1 and MO5. Then the questionnaire was distributed to the same sample again and calculated validity and reliability. This time ordinal alpha using R software was used to calculate internal consistency. The R code for calculating ordinal alpha is below.

```
>install. packages ("psych")        #polychoric correlation for ordinal data.
>require (psych)
>install. packages ("haven")        #loading SPSS files to R
>require (haven)
>data ← read_sav ("SPSS file path") #reading SPSS data file to R
>myfile ← polychoric (data)         #calculating polychoric correlation matrix
>alpha (myfile$rho)                 #calculating ordinal alpha
```

ExtractionMethod:PrincipalComponentAnalysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 9 iterations.

Rotated Component Matrix[a]							
	Component						
	1	2	3	4	5	6	7
PL1				.709			
PL2							
PL3					.782		
PL4				.620			
PL5		.727					
PL6							
PL7		.675					
MO1							
MO2			.722				
MO3			.524			.565	
MO4						.732	
MO5							
EV1	.712						
EV2	.794						
EV3							.583
EV4							.780

Table 11: Rotated Component Matrix

Ordinal alpha calculated for the updated (12 questions) questionnaire was 0.89 (> 0.7). Content validity (S-CVI/Ave) was increased up to 0.9 and (S-CVI/UA) up to 0.50 by elevating the validity and the reliability of the questionnaire to an accepted level. Table 12 represents the updated content validity calculation.

Discussion

Measuring metacognition is not an easy process as it involves a mental process that is not directly observable. The search for an optimum scale which measures metacognition successfully is still under discussion. Online methods, such as the Thinking Aloud Protocol (TAP), are preferred over offline methods to measure metacognition in Mathematics. (Veenman & van Cleef, 2019). But measuring metacognition using TAP is not feasible for large classes, especially in online settings. The self-report questionnaire, designed here based on Think Aloud, is suggested as a solution to practical issues in TAP. A teacher who wishes to measure metacognition in Mathematical problem-solving should share this questionnaire soon after the exercise to minimize memory loss.

	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Experts in agreement	I-CVI	UA
Item										
Q1	1	1	1	1	1	1	1	7	1.00	1
Q2	1	1	1	0	1	1	0	5	0.71	0
Q3	1	1	1	1	1	1	0	6	0.86	0
Q4	1	0	1	1	1	1	1	6	0.86	0
Q5	1	1	1	1	1	1	1	7	1.00	1
Q6	1	1	1	0	1	1	0	5	0.71	0
Q7	1	1	1	1	1	1	1	7	1.00	1
Q8	1	1	1	1	1	1	1	7	1.00	1
Q9	1	1	1	1	1	1	1	7	1.00	1
Q10	1	1	1	1	1	1	1	7	1.00	1
Q11	1	1	1	1	1	1	0	6	0.86	0
Q12	1	1	1	0	1	1	1	6	0.86	0
								S-CVI/Ave	0.90	
Proportion Relevance	1	0.92	1	0.75	1	1	0.67	S-CVI/UA		0.50
		Average proportion of items judged as relevance across 7 experts					0.90			

Table 12: Content Validity Calculation for Updated Questionnaire

This questionnaire initially contained 16 questions, corresponding to the 15 activities suggested in systematical observations by Veenman (2019) and colleagues. Despite confirming validity (content and construct), it exhibited very low internal consistency. First, Cronbach's alpha was used to measure internal consistency. However, it was later understood that Cronbach's alpha is not recommended for a scale with ordinal values, as it is associated with continuous values. (Gadermann et al., 2012). Questions with low factor loadings, which did not contribute at the same level to measuring metacognitive skills in Mathematical problem-solving, were identified after conducting an Exploratory Factor Analysis (EFA). After removing those questions, ordinal alpha was calculated to measure internal consistency, resulting in a value of 0.89, demonstrating high reliability. The removal of these questions also increased content validity to 0.9.

Conclusion

The questionnaire designed in this paper provides a solution for measuring metacognitive skills in Mathematical problem-solving for large classes. This is a viable option for online classes with a large number of participating students, where applying TAP is not feasible due to the additional time and effort it requires. High validity and reliability of the newly designed questionnaire confirms that it is an effective and efficient scale for measuring metacognitive skills. As the next step, the intention is to study the relationship between the Think Aloud Protocol and the designed questionnaire to understand the extent to which it aligns with TAP.

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Science Students' Perception of Learning Environment and Its Impact on Their Performance

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Abstract

In majority of schools, primary, secondary or tertiary, Learning Environment is being presented to be made up of only the curricular activities, undermining the co-curricular and extra-curricular activities. Whereas, Learning Environment as classroom social climate is not made up of only the learning aspect of the school, but also the interaction between the students and their teachers, the teaching-learning activities of the classroom, as well as the laboratories. Hence, this study investigates some science students' perception of their learning environment and its impact on their performance. The population of the study is all science students of all Colleges of Education in three Southern States of Nigeria. Sample for the study include all 200 level students offering five chosen science subjects in a College of Education each from the three states. Learning Environment Inventory (LEI) and data obtained from school's record of students' performance were the instruments employed in the study. The finding shows that the more positive the students perceived their learning environment, the higher their performance. It is therefore recommended that learning environment instrument be used in assessing the relationship between teachers and students, as well as the environment of learning institutions.

Keywords: Students, Perception, Learning Environment, Performance

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Introduction

The academic study of the school environment, commonly called institutional research, offers invaluable insights for other researchers to make objectives operational. Researchers can show significant effects, clarify relationships, and expose consequences using analytical tools. For instance, class size may correlate with teaching methods, producing significant learning outcomes (Fraser, 1998).

The learning environment is complex, encompassing more than just the interaction between students and their teachers or tutors. It includes the teaching-learning activities of the classroom and the availability of appropriate facilities, such as laboratories, and extends beyond the physical school structure to include all activities. In schools with residential students, the learning environment also includes the physical campus, classroom activities (co-curricular activities), extracurricular activities, and the activities in the hostels. This comprehensive approach ensures that all aspects of the learning environment are considered, providing a holistic view of education in Nigeria –from primary through secondary to tertiary (Nwambam et al., 2018).

Understanding the students' perspective is a crucial aspect of education research. This study explores how students in Southwestern Nigeria perceive their learning environment. We will explore their sense of cohesiveness, speed of the class, equipment availability, difficulty in understanding, and satisfaction, which are all scales on the Learning Environment Inventory (LEI) (Fraser et al., 1982) (Fraser, 1998). Furthermore, we aim to establish whether a correlation exists between the learning environment and student achievement (Goh & Khine, 2002). By doing so, we hope to provide valuable insights that can be used to enhance the learning environment and, ultimately, student achievement.

Population

The population comprises all students offering the five chosen science subjects used in the study as teaching subjects in the chosen colleges of education.

Research Design

The study was carried out in three Colleges of Education in South-West Nigeria. The institutions are of higher education and award professional certificates to their graduates after three academic sessions using the same curriculum. The certificate awarded is the National Certificate of Education (N.C.E.), which makes the graduates professional teachers. The classroom perceptive approach to the learning environment was used in the study.

Sample

This comprises six hundred and six (606) second-year students of the chosen colleges. The students chosen are those offering science subjects (Biology, Chemistry, Physics, Mathematics, and Agricultural Science) as main teaching subjects along with Education, which is the principal and compulsory subject offered by all students. The second-year students were chosen because they have been in the colleges for more than three semesters and will be able to respond better to the items on the instrument than the first-year students who, at the time of the study, have not spent two semesters in the colleges. Third-year students were excluded from the study because they were in their final examination period.

Sampling Technique

Random sampling was used to select six hundred six (606) students offering the five chosen science subjects in the three Colleges of Education.

Sources of Data:

The primary source through which data was obtained is an inventory. Each student was given an inventory to respond to; the responses were quantified to obtain scores. The score of each student in the chosen science subjects in the first-semester examination of the 2020/2021 Academic Session was also obtained for the researcher to know the students' Academic performance in the perceived learning environment.

Instrument

The instrument is an inventory of the learning environment of the students referred to as the Learning Environment Inventory (LEI). The Learning Environment Inventory (LEI) is a well-established instrument designed to measure the social climate of learning within a classroom as perceived by its students. As an expansion and improvement of Walberg's (1966) Classroom Climate Questionnaire (C.C.Q.), the LEI encompass 18 scales that capture the nature of interpersonal relationships within the class, as well as the structural characteristics of the learning environment.

However, five scales constitute the LEI used for this study. The inventory has two parts. The first part covers personal information about the students – Name, Year of Study, and Subject. The second part consists of thirty items covering the five chosen scales. The students are expected to read each item and respond to each by putting a tick (✓) under the chosen option on the four-point scale to show the extent of their agreement or disagreement with each item. Six items were written for each scale for a consistent internal rating.

The scales are:

Cohesiveness: It is the intimacy that develops when several individuals interact for some time and separate group members from non-members.

Speed: This is the class's progress rate and tells how well the teacher can communicate with and adapt to the group's needs.

Equipment: These are learning materials available and provided during the teaching-learning process.

Difficulty: Difficulty in understanding shows how each student feels that he is learning in terms of ease, effect requirement, skill, or ability about the students.

Satisfaction: This shows whether students like or dislike the science subject they are offering, the teacher, classmates, or the class as a whole. Some of the items on these scales were modified, making the instrument an adapted form of the original LEI developed by Walberg & Anderson in 1968, which was revised in 1969.

Data Analysis

The data reported is based on a 1 to 4 score for each item. Strongly disagree is scored 1, disagree is scored 2, agree is scored 3, strongly agree is scored 4. Each student's score on any scale is based on adding scores for each item in the scale. Since each scale consists of six items, the range of scores on a scale is 6 to 24.

Krippendorff's (2011) alpha reliability shows the extent to which an individual respondent responds similarly to each item on the scale, that is, the internal consistency of each scale.

Table 1: Scale Reliability

Scale	Reliability (Co-efficient)
Cohesiveness	0.51
Speed	0.10
Equipment	0.41
Difficulty	0.44
Satisfaction	0.70

To describe the responses of students in each class offering the same subject to each scale, the percentage of low and high responses for each scale in each class was calculated and shown in the following tables.

Table 2: Frequency percentage of low and high responses for cohesiveness scale

Class	Low	High
Physics	-	100
Chemistry	-	100
Biology	-	100
Mathematics	5.9	94.1
Agricultural Science	10.4	89.6

All the respondents (students) in the Physics, Chemistry, and Biology classes had total scores of responses ranging from 13 to 24, which shows that all the respondents agree with the items on the scale. 5.9 and 10.4 percent had total scores for responses ranging from 1 to 12 in Mathematics and Agricultural Science classes, respectively. These two figures are the percentage of respondents who disagree with the scale items.

Table 3: Frequency percentage of low and high responses for speed scale

Subject	Low	High
Physics	19.0	81.0
Chemistry	12.0	87.9
Biology	38.9	61.1
Mathematics	11.3	88.7
Agricultural Science	6.5	93.5

In all classes, a minimum of 6.5 percent and a maximum of 38.9 percent of respondents having total scores ranging from 1 to 12 were recorded. These show the lowest and highest percentages of students who disagree with the speed scale items, which were recorded in Agricultural Science and Biology classes, respectively.

Table 4: Frequency percentage of low and high responses for equipment scale

Subject	Low	High
Physics`	76.2	23.8
Chemistry	57.6	42.4
Biology	44.4	55.6
Mathematics	62.7	37.3
Agricultural Science	64.9	35.1

Only the Biology class has less than 50 percent of the total respondents having total scores ranging from 1 to 12; all others have the majority of the respondents scoring low on the LEI scale. This shows that the science classes could be better equipped by the respondents. The respondents may usually be only allowed to use or come in contact with the equipment on their own in Biology classes, where a proportion of over 50% responded highly to the equipment scale.

Table 5: Frequency Percentage of low and high responses for difficulty scale

Class	Low	High
Physics	9.5	90.5
Chemistry	12.1	87.9
Biology	33.3	66.7
Mathematics	7.5	92.5
Agricultural Science	25.0	75.0

The biology class recorded the highest number of respondents having low total responses on this scale. This shows that 33.3 percent of the total respondents in the biology class disagree with items on the scale. This class was followed by the Agricultural Science class, with 25 percent of the respondents disagreeing with items on the scale. Most students in the remaining three classes agree with items on the difficulty scale.

Table 6: Frequency percentage of low and high responses for satisfaction scale

Class	Low	High
Physics	14.3	85.7
Chemistry	6.1	93.9
Biology	Nill	100
Mathematics	11.5	88.5
Agricultural Science	7.9	92.1

All the respondents in the Biology class had high total scores for responses on the satisfaction scale, which is a total score between 13 and 24. This shows that they all agree with the items on the scale, and most of the respondents in the other classes also agree with the items on the scale.

For all the scales, a more significant percentage of the respondents responded highly to each subject except for the equipment scale.

As a measure of item validity, each item was correlated with the scale to which it belongs using the total number of respondents (606). The coefficient values shown in Table 7 were obtained for the items on the LEI scale used.

Table 7: Correlation of Items with scales

Item	Correlation value
1.	0.34
2.	0.53
3.	0.33
4.	0.54
5.	0.66
6.	0.58
7.	0.45
8.	0.40
9.	0.61
10.	0.61
11.	0.55
12.	0.53
13.	0.37
14.	0.16
15.	0.58
16.	0.51
17.	0.32
18.	0.49
19.	0.48
20.	0.44
21.	0.53
22.	0.29
23.	0.30
24.	0.34
25.	0.68
26.	0.48
27.	0.30
28.	0.41
29.	0.42
30.	0.32

The validity of an item is the extent to which the interpreted results of a test is warranted, the extent to which it fits the scale on which the item is put Kimberlin & Winterstein (2008).

One item on the difficulty scale just slightly measures what it is expected to measure (item with correlation value of 0.16). Two items on the cohesiveness and satisfaction scales have low correlation values, three items on equipments and difficulty scales have low correlation values. All other items on the LEI scales have been shown to measure what they are supposed to measure substantially.

Table 8: Number of respondents used for each subject

Subject	Number of respondents
Physics	63
Chemistry	96
Biology	54
Mathematics	162
Agricultural Science	231
Total	606

Raw scores were obtained for each student in each class being used in the study in three courses taken in the first-semester examination of the 2020/2021 Academic Session. Two courses carry three credits each, and the third carries two credits. The weighted means of the scores were then calculated for each student by multiplying the raw score obtained by the students in the various courses by the number of credits each course carries. All these figures were added and divided by 8, the total number of credits for the three courses. This resulted in the weighted mean for each student in the subject.

To know the mean achievement score of all the students in each subject used for the study, the weighted means of all the students in each subject were added and divided by the total number of respondents. The mean achievement score and standard deviation values for each class are shown in Table 9.

Table 9: Mean Achievement and Standard Deviation Values for subjects

Subject	Mean Achievement Score	Standard Deviation
Physics	48.43	7.22
Chemistry	56.84	7.64
Biology	52.56	8.18
Mathematics	40.32	13.63
Agricultural Science	58.44	9.68

The standard deviation shows the amount of variability of all the scores in a distribution (sample in this study). Relating the sample sizes to the mean achievement scores obtained, it can be said that the smaller the sample size, the higher the achievement and the lower the variability among scores though this has been proved otherwise by the mean achievement score in Agricultural Science sample. However, the mathematics sample proves that the lower the mean achievement score, the higher the variability among students scores in the class.

Taking a mean achievement score of 40 as the pass mark, it will be observed that the mathematics class has the least mean achievement score of 40.32 which is just a little above pass mark chosen though the mathematics sample is not the largest sample.

Four null hypotheses were tested in the study and they are stated below:
1. There will be no significant relationship between cohesiveness and the performance of science students.
2. There will be no significant relationship between speed of the class and the performance of science students.
3. There will be no significant relationship between difficulty in understanding and the performance of science students.

4. No significant relationship will exist between satisfaction and performance of science students.

Table 10: Observed values of scale correlated with achievement scores

Scale	Observed
Cohesiveness	0.163
Speed	0.195
Difficulty	0.325
Satisfaction	0.865

An alpha (α) level of 0.01 r should be 0.0972 to be significant. All observed r values were more outstanding than 0.0972; thus, all the null hypotheses were rejected.

The alternative hypotheses were accepted that a significant relationship exists between the scales and achievement scores. This means that the scales show a pattern of relationship with achievement.

The difficulty scale also gives this type of meaning to its relationship pattern with achievement, which is only sometimes the case in a practical sense.

Finding of the Study

The reliability values obtained using coefficient alpha 8 ranged from 0.1 to 0.7, the highest being the satisfaction scale and the lowest the speed scale. These values show the extent of internal consistency of the scales on the LEI used.

The students' responses to each of the scales in the LEI showed that a more significant percentage of the students responded highly to the scales for each subject except for the equipment scale. This means that the students' learning environment agreed with the items describing the environment on the other four scales of LEI used. In contrast, the environment needs more equipment, or students are usually not allowed to come in contact with the instruments alone.

In biology alone, over 50% of the respondents agree with equipment availability for students. Respondents to all the scales in all other subjects disagreed with equipment availability, thus agreeing with the unavailability of equipment for the subject.

Most items in the LEI used were found to be valid. There are a few cases where the correlation values obtained from the correlation of each item with the scale it belongs to are low, indicating low validity of the items.

It was also found that there was a significant relationship between the cohesiveness, speed, difficulty, and satisfaction scales with the students' achievement.

The scales were identified as independent variables, while achievements were identified as the dependent variable.

Conclusion

The perceptual approach that entails recording or reporting by an individual with direct experience with the environmental situation over time will enable an individual to give a better and more reliable report/judgment of the environment he is describing. The use of the Learning Environment Inventory LEI in assessing class environments has undoubtedly contributed to the perceptual approach to measuring the classroom climate.

Recommendations

- Learning environment instruments should be used in assessing the relationship between teachers and students since this also affects students' academic performance. The findings will provide teachers feedback on improving relationships with students for higher academic performance.

- Instruments for measuring the environment of learning institutions should be used in institutions of learning and the various fields of learning. The findings will point out defects in the institution's programs and administration patterns, and improvement methods can be suggested.

Acknowledgement

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The Integration of Project-Based Teaching and Learning to Enhance Knowledge and Creative Thinking Skills for Students in Science-Based Technology Demonstration Classes, Thailand

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Abstract

The aims of this research were 1) The integration of project-based learning to enhance knowledge and creative thinking skills; 2) Comparative assessment of students' learning progress through the utilization of project-based learning; 3) Examination of the capacity for creative output via project-based endeavors; and 4) Student satisfaction regarding project-centered learning management. The study involves 14 students enrolled in Pre-Engineering curriculum. The instruments utilized in this study encompass the instructional activity arrangement plan, assessments measuring learning and creative output capabilities, and satisfaction surveys. Statistical employed comprise mean values, standard deviations, and independent paired t-tests.

The study results reveal that:

1. The project-based learning activities led to significant gains in knowledge, understanding, and learning skills. Students were able to apply their learning collaboratively and bridge existing knowledge with new insights. Additionally, they demonstrated the ability to develop their own projects, evaluate group outcomes, and take pride in their achievements. The overall average value for this aspect was 3.90.

2. The statistical analysis revealed a significant improvement in post-learning progress compared to pre-learning at a significance level of 0.01.

3. The ability to create innovative works through collaborative project-based learning across various activities showed an overall increase. This was assessed based on four aspects: Ability, Creative Ideation, Application of Ideas and Knowledge, and Appreciation. The overall average value for this aspect was 3.59.

4. Students expressed high satisfaction towards project-based learning, both in terms of learning activity organization and the educational benefits. The overall average value for this aspect was 4.26.

Keywords: Integrated Teaching and Learning, Creative Thinking Skills via Project-Based Approach, Science and Technology Classroom Demonstration

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Introduction

The Technology Foundation Science Laboratory Classroom under the supervision of the University (TU) represents an extension of collaborative efforts from a pilot program in vocational technology education management at the technical college level (Collaborative Learning Program between Lanna Rajamangala University of Technology and San Kamphaeng Technical College). This initiative transpired between the academic years 2018-2020 in Diploma of Mechatronic and a collaborative educational prototype development project based on technology has been jointly undertaken by Lanna Rajamangala University of Technology Lanna and the Office of the National Science, Technology and Innovation Policy Commission, encompassing an educational framework for a 3-year vocational certificate and/or a 2-year advanced vocational certificate, followed by a 4-year bachelor's degree. The jointly organized educational programs adhere to the central vocational certificate curriculum set by the Office of Vocational Education Commission. The educational approach follows the format of a continuous education system, encompassing the foundation vocational certificate level, higher vocational certificate level, and subsequently the bachelor's degree level. This framework is modeled after the Advanced Technology Preparatory School, Technical College, and Institute of Technology of Lanna Rajamangala University of Technology. This university-affiliated institution serves as a regular school and designates master's degree students as mentor teachers, who are responsible for student well-being, learning support, and project advising for vocational certificate students. Moreover, university and college faculty participate in teaching and knowledge dissemination in collaboration with industry professionals. This program also focuses on imparting fundamental practical skills to meet industrial standards. The curriculum is emphasis on integrating academic and practical knowledge which derived from industrial context that aims to cultivate student attributes congruent with pursuing further studies in advanced vocational technology education. From the reason above, graduates can pursue two educational aspects: 1) The productivity students are able to study in advanced vocational certificate program. 2) The students who have aptitude in ideation, design, and product development will be cultivated into innovative professionals.

The Office of National Economics and Social Development (2016) emphasizes that both the present society and the future are significantly influenced by science, as science pertains to the daily lives and professions of individuals. Various tools, products, and conveniences utilized for living and working which are the combination of scientific knowledge, creative thinking and other disciplines. Scientific knowledge provides human cognitive development, including causal and creative thinking, analytical thinking, critical evaluation, and skills crucial for systematic inquiry and comprehensive problem-solving. Moreover, the development of the labor market skills and life skills in the 21st century which is essential for individuals of all age groups. For instance, children, adolescents, and young adults need to have skills such as systemic analytical thinking and creative thinking, while also emphasizing preparedness for the skill development in various domains, work skills, and the ability for entering in the labor market, this is accordance with the ideas of Pacharee, Nakphong, Siriwan, Wanichawattanaworachai, Rujiraporn, Rammasiri, and Montchai Pongsakornnaruewong (2021). In the context of science education, it is imperative to foster the following qualities among the modern Thais: 1) effective communication skills, analytical thinking, problem-solving abilities, and creative thinking; 2) self-learning propensity, an inclination towards reading, and a lifelong commitment to learning, as demonstrated by the findings of Rewadee, Namthongdee (2015), which indicated that the labor requirements of employers and organizations with a transformation in 2014 by the organization for economic

cooperation and development (OECD) analysis presented that the most anticipated skills for employers in the new organizational era are analytical and creative thinking skills.

Based on the evaluation of the assessment of students' skills at the international level conducted by the Organization for Economic Cooperation and Development (OECD: PISA, 2018), it is presented that the evaluation of the aptitude of 15-year-old students in terms of knowledge application and essential competencies for real-life challenges, consisting of three aspects: reading, mathematics, and science. This assessment emphasizes analytical thinking and interpretation. The PISA 2020 assessment reported the performance of Thailand in the international arena, ranking 68th in reading, 59th in mathematics, and 55th in science in 2018. In the Asian-Pacific region, Thailand only surpassed Indonesia and the Philippines, with around 60% of students scoring below the minimum of proficiency level in reading, 53% scoring below the basic proficiency level in mathematics, and 44% scoring below the baseline proficiency level in science. This result indicates a declining proficiency in reading and also decrease continuously in scores of both mathematics and science for Thai students. This correlates with resource allocation and education development investment in various Thai schools.

From the problems mentioned above, the researchers intend to implement for problem resolving by organizing learning activities using project-based learning that integrate the disciplines of science, technology, engineering, and mathematics (STEM). These four competencies are essential for children and youth in contemporary and future societies as they foster experiential learning and practical engagement, nurturing analytical and creative thinking for problem-solving. This approach diverges from traditional methods that emphasize on memorization rather than practical application. Learning through project-based approaches encourages students to engage in hands-on experimentation and emphasizes the development of creative and analytical thinking skills. This correspond with the perspective of Israsena Na Ayudhya (2018), who proposes that design thinking must be practiced to truly understand. The main goal is to focus on fostering an understanding of design thinking through experiential learning, comparing outcomes derived from employing different tools or methods.

Then, summarized the content including the actual working method and illustrative examples. The purpose of organizing learning through project-based approaches is to enhance thinking and learning processes via practical engagement, instilling an appreciation of science, technology, engineering, and mathematics (STEM) education, and recognizing their applicability in daily life, as presented by Porntip Siripattrachai (2013). This approach characterized by project-based learning that is not only emphasized on content memorization of scientific and mathematical but also to understand the theories or laws via practical implementation with skill development in critical thinking, questioning, problem-solving, information retrieval, and analysis of discovered findings. Furthermore, students have the opportunities for problem analysis and innovation design for problem solving. Students are also recognize their weaknesses or limitations which this process enables them to successfully achieve their objectives and facilitates effective communication. It reflects their progress and accomplishments that demonstrated via the presentations and their contributions to enhancing problem-solving processes in subsequent endeavors.

From the circumstances and reasons outlined above, the research team aims to develop teaching and learning methodologies to enhance creative thinking skills via project-based learning for first-year preparatory engineering students at Rajamangala University of

Technology Lanna, Chiang Rai. This research focus on students' ability to create and develop knowledge via hands-on practice rather than content memorization. Moreover, students are encouraged to apply the knowledge in their daily lives with Re-Skilling, Up-Skilling for technological advancements and the changing era that leads to a transformative learning process which prepare the students for industry labor market.

Research Objectives

1. To integrate teaching and learning for enhancing knowledge and creative thinking skills via project-based learning.
2. To compare the progress of student learning outcomes via project-based learning.
3. To assess creative ability via the organization of learning activities based on projects.
4. To investigate student satisfaction to project-based learning.

Research Framework

The study investigates the creative capabilities within the framework of project-based learning for students of the vocational certificate program in engineering preparation. The relationships between independent and dependent variables are depicted in the following Figure 1.

Project-based learning management based on integrated learning activities	**Outcomes of project-based learning management, integrated learning activities**
Step 1 Determine the topic of study. **Step 2 Research and Collect information** **Step 3 Plan the project** **Step 4 Act according to the plan** **Step 5 Summary and discussion** **Step 6 Presentation and evaluation**	**1. The results of the integration of project-based learning management** **2. the ability to create works based on integrated learning activities** **3. The student's satisfaction towards the project-based learning management with the concept of integrating learning activities.**

Figure 1: Depicting the relationship between independent and dependent variables

Benefits Derived From the Research

1. The learning outcomes which create the collaborative learning between instructors and students by stimulating the students' self-learning.
2. The study enables students to transfer knowledge to new experiences.
3. The research generates learning for developmental outputs through systematic and continuous thinking and analysis.
4. The study provides experiential learning via the scientific methodological learning process.
5. The research engenders effective learning via students' collaborative work that achieved by analyzing, interpreting, and accepting the perspectives of others.

Research Methodology

This research employs a combination of research methods and pre-experimental research design in the form of the One-Group Pretest-Posttest Design, and quantitative research. The aim is to integrate learning and enhance creative thinking and knowledge using project-based learning, it also figures out the satisfaction to learning activities involving project-based learning.

Population

The population consists of 14 students enrolled in the first semester of the vocational certificate program in engineering preparation for the academic year 2023.

Research Instruments

The research instruments for data collection are as follows:
1. Five learning activities integrated with the project-based learning which are:
    1.1 Ice Cream Stick Bridge
    1.2 Robotic Arm
    1.3 MBOT
    1.4 Application of Robotics and Automation Systems in CNC Machining
    1.5 Controlling Light via Smartphone, which serves as extracurricular activities as curriculum supplementing. The instructors have less role in guidance while assign more roles for the students, as shown in Figure 2.
2. Assessment questionnaire for measuring the level of creative abilities via project-based learning activities.
3. Progress assessment test for measuring learning progress via project-based learning activities.
4. Satisfaction survey questionnaire for measuring student satisfaction with learning activities that integrate project-based learning with learning integration concepts.
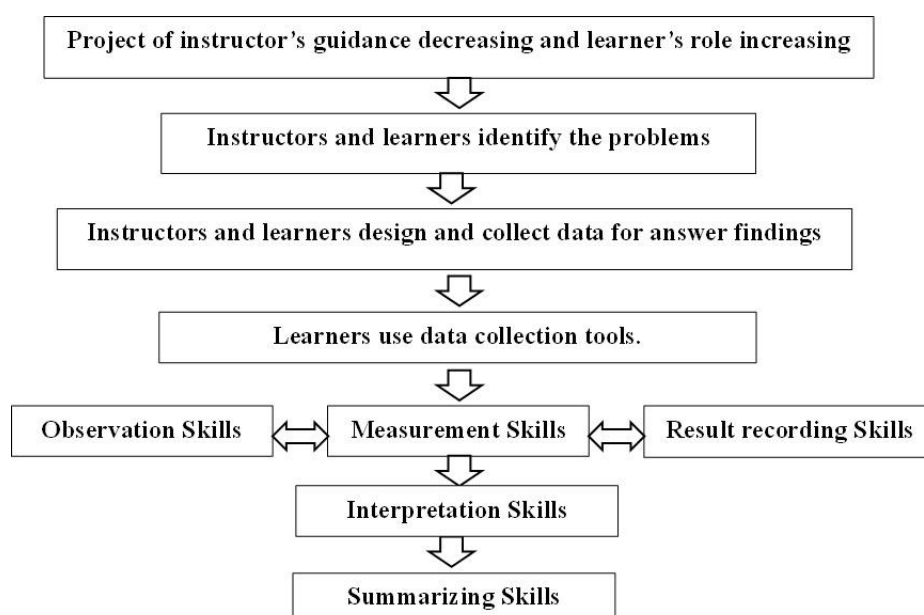
Figure 2: Project-based learning approach decreasing, Student's Role increasing

Steps for Developing Research Instruments

1. Literature Review and Research Exploration: Conduct a review of relevant literature, documents, and research related to organizing learning activities using project-based learning and integrating learning integration concepts. This is used for creative output and the evaluation process.

2. Development of Learning Activity Plan: Develop a learning activity plan by using project-based learning with learning integration concepts. This plan comprises of 24 class sessions.

3. Development of Creative Abilities Measurement Instrument: Design a measurement instrument for creative abilities based on learning activities that integrate project-based learning and learning integration concepts. This measurement assesses creative output across four aspects: 1) Project Execution Skills, 2) Innovative and Creative Thinking, 3) Application of Concepts and Knowledge in Relevant Sciences, and 4) Appreciation and Pride for individual and Group Achievements. This measurement employs a 5-point Likert scale, including "Very High," "High," "Moderate," "Low," and "Very Low."

4. Creation of Learning Outcome Assessment Test: Create a pre-test and post-test assessment test for learning outcomes of the organized learning activities using project-based learning. This multiple-choice test consists of 30 questions. Scoring criteria are set as follows: 1 point for a correct answer and 0 points for an incorrect answer.

5. Development of Satisfaction Survey Questionnaire: Develop a questionnaire to measure student satisfaction with the learning activities based on project-based learning used in this research. The researcher designs a closed-ended questionnaire using a 5-level evaluation scale:
     5: Very Satisfied
     4: Satisfied
     3: Moderately Satisfied
     2: Less Satisfied
     1: Not Satisfied

For the interpretation of the satisfaction score meaning regarding student satisfaction with learning activities based on project-based learning, the scores are interpreted as follows:
     4.50 – 5.00: Very Satisfied
     3.50 – 4.49: Satisfied
     2.50 – 3.49: Moderately Satisfied
     1.50 – 2.49: Somewhat Satisfied
     1.00 – 1.49: Not Satisfied

Quality Verification of Research Instruments

Research instruments comprising diverse data collection in this study. These instruments spanned the spectrum of learning activity organization utilizing project-based learning as a foundation. These instruments were:
     1. A measure of integrative creative thinking skills in project execution.
     2. A measure of creative output abilities.

3. A pre- and post-test assessment of learning outcomes based on project-based learning.
4. A satisfaction questionnaire regarding the learning activities for project-based learning.

The verification process involved three specialized experts: 1) innovation and invention development, 2) content and learning activity organization, and 3) assessment and educational evaluation. This panel of experts assessed the content validity and completeness of the instruments. The instruments' appropriateness was established by determining the Index of Congruence (IOC) falling between 0.65 and 1.00, alongside determining the level of difficulty ranging from 0.20 to 0.80 and the discrimination power more than 0.20. Furthermore, the instruments' reliability was established using the Cronbach's Alpha Coefficient, resulting in a reliability of 0.89.

These research instruments were tested with a non-sample group of 20 students from the Professional Certificate in Engineering Preparation Course under the Education Equitable Fund (EEF). The data collected from this preliminary testing was refined based on expert feedback and adjustments, culminating in the development of an authentic research instrument. This refined instrument will be employed with the actual target group.

Data Collection

1. Pre-experiment Stage: During this stage, the research team prepared various aspects, including:
1.1 Creation of research instruments.
1.2 Conducting orientation to introduce the learning approach based on project-based learning.
1.3 Administering a pre-test assessment of learning outcomes before implementing the learning activities, involving 5 activities with 30 multiple-choice questions to measure fundamental knowledge.

2. Experiment Stage: The research team implemented the learning activity plan utilizing project-based learning over 12 weeks, with two 60-minute sessions per week, totaling 24 sessions, for the target group of students.

3. Post-Experiment:

3.1 Post-Experiment Data Collection:

Post-experiment data was collected by using a post-test assessment of learning outcomes that related to learning activities of project-based learning. The assessment included 5 learning activities with 30 multiple-choice questions. Then, the test results were analyzed, and the differences in scores before and after the experiment were calculated.

3.2 Student Satisfaction Questionnaire:

Students were asked to complete a satisfaction questionnaire regarding their experience with the learning activities based on project-based learning. This questionnaire was used for research data analysis.

Research Data Analysis

The process of analyzing research data includes the following steps:

1. Analyzing Learning Outcomes:

Data analysis was conducted to study learning outcomes based on learning activities utilizing project-based learning. Pre- and post-test assessments were performed, and the results were used to calculate means, standard deviations, and a dependent samples t-test.

2. Analyzing Creative Abilities and Integration:

Data analysis was conducted to assess creative abilities and integration in accordance with the learning activity organization approach based on project-based learning. This analysis was conducted based on the mean and standard deviation of the results obtained from learning activities.

3. Analyzing Student Satisfaction:

Data analysis was carried out to measure student satisfaction with the learning activities organized using project-based learning. This involved calculating the mean and standard deviation of the results obtained from the satisfaction questionnaire.

Research Results

1. Integration of Teaching and Learning

The study focused on enhancing knowledge, creative thinking skills, and practical abilities via learning activities based on project-based learning. Topics included wooden bridge construction, ice cream making, robotic arms (MBOT), applying robotics, and automated systems in Computer Numerical Control (CNC) and remote control of lighting. The results indicated that students possessed knowledge, understanding, and learning skills that could be applied and transferred, facilitating the integration of prior and new knowledge and experience. See Table 1 for details.

Items	integrated learning ability	μ	σ	level learning progress
1	Cognitive	3.42	0.58	moderate
2	Thinking and analytical skills	3.60	0.55	high
3	Operational and integration skills	3.78	0.50	high
4	Communication skills	3.90	0.44	high
5	Applying and knowledge and practice linking	3.80	0.47	high
Average all aspects		**3.90**	**0.94**	**high**

Table 1: Integration of teaching and learning to promote knowledge creativity and work skills according to learning activities

2. Comparative Learning Outcomes

Comparative analysis of student learning outcomes was conducted by employing project-based learning in combination with various learning activities, such as wooden bridge construction, ice cream making, robotic arms (MBOT), applying robotics, automated systems in CNC, and remote control of lighting. Statistical analysis showed significant improvement in learning outcomes at a significance level of .01. Refer to Table 2 for specifics.

Learning outcomes	No. of students	Total score	μ	σ	t	p
Pretest	14	30	15.50	2.17	13.00	.00
Posttest	14	30	26.78	1.92		

$\rho \leq .01$

Table 2: Comparison of student learning outcomes using project-based learning management

3. Creative Abilities Enhancement

The enhancement of creative abilities via project-based learning integrated with learning concepts. The topics are wooden bridge construction, ice cream making, robotic arms (MBOT), applying robotics, automated systems in CNC, and remote control of lighting, was evaluated in four aspects: 1) project execution skills, 2) creative thinking, 3) application of ideas and knowledge in related disciplines, and 4) recognition and pride in group and individual accomplishments. Results showed overall improvement in creative abilities in all dimensions. See Table 3 for details.

The ability of creative learning activities	Assessment result		Progress difference	Skill level
	pretest μ	posttest μ	μ	
1. The ability to do projects	1.14	3.64	2.50	progressive
2. Creativity	1.50	3.57	2.07	progressive
3. Applying concepts and knowledge to relevant studies	1.21	3.21	2.00	progressive
4. Appreciation and pride of group and individual work	1.50	3.93	2.43	progressive
Average of all aspects	**1.33**	**3.59**	**2.25**	**progressive**

Table 3: Creative abilities using project-based learning management

4. Student Satisfaction

Student satisfaction regarding learning activity organization and perceived benefits of project-based learning was found to be high overall. This satisfaction encompassed both the learning activity structure and the benefits derived from the learning process. Refer to Table 4 for more information.

Items	Assessment Items	μ	σ	Level satisfaction
1	Learning activities	4.13	0.47	high
2	Benefits of learning management	4.40	0.54	high
Total average		4.26	0.46	high

Table 4: Student satisfaction towards project-based learning management

Conclusion

The usage of project-based learning as a foundation stimulates learners' potentials in knowledge acquisition, critical thinking, collaborative teamwork, and practical skills development. This approach involves engaging learners in scientific method to develop knowledge, thinking processes, and effective teamwork skills, leading to the creation of high-quality outcomes. This process also entails systematic self-monitoring and evaluation of progress at both individual and group levels. Therefore, teaching via project-based learning encourages observation, questioning, hypothesis formulation, and self-directed knowledge seeking, enabling students to answer their own inquiries, consolidate their learning outcomes, and comprehend their discoveries.

Project-based teaching methods can be integrated within or beyond regular class hours, adaptable to both individual and group settings. If aligned with specific subjects or content, it's referred to as a subject-based project, such as projects in Science or Mathematics. This is the concept of Nattaya Sareeto (2022), proposing that project-based learning, which involves experiential learning through investigation, empowers students to explore, leading to holistic solutions. This approach encourages systematic problem-solving, planning, and various levels of thinking, all facilitated by teachers who inspire, guide, and closely advise students throughout the learning process – from topic selection, data gathering, project planning, execution, to application.

Project-based teaching helps develop learners in terms of knowledge and attributes by involving them in activities that entail investigation, problem-solving, and real-world application of knowledge. This cultivates creative thinking and continuous development. Learners engage in genuine pursuits driven by their interests and aptitudes, leading to innovative outcomes derived from their learning experiences. Furthermore, they bridge learning experiences to novel creations and experiences, fostering personal pride and value recognition in their work. This aligns with the views of Pakawat Kwankaew et al. (2016), suggesting that project-based learning nurtures creativity and encourages learners to innovate, connecting learning to new experiences and creations.

Recommendations for Future Research

1. Research should focus on establishing a comprehensive link between various fields of knowledge through continuous interdisciplinary integration.
2. Short-term professional development courses centered based on project-based learning should be designed for all educational levels to cultivate teamwork, skills, thinking processes, and collaborative work.
3. Further studies should investigate the implementation of project-based learning in different subjects, enhancing analytical and critical thinking skills.
4. Research should focus on developing teaching methodologies that emphasize practical application across all levels and disciplines within universities.

Acknowledgements

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Attitudes and Preferences of Nursing Undergraduates Towards Working Abroad: A Cross-Sectional Study in Vietnam

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Abstract

This cross-sectional study investigates the attitudes of undergraduate nursing students in Vietnam towards international study and work opportunities, as well as the factors influencing their preferences. Data was collected through a web-survey questionnaire in April 2023, targeting students from a university in Vietnam, including participants in the Japanese language special program and regular program. The study findings emphasize the significance of international experiences, particularly in enhancing communication and cross-cultural skills, fostering personal development, and improving career prospects for nursing undergraduates. Moreover, students in the special program revealed distinct preferences when considering their ideal destinations for studying or working abroad. They placed a greater emphasis on factors like a clean and beautiful living environment, long-term job prospects, and festivities. Additionally, for those interested in pursuing postgraduate study abroad, the students favored universities that offered job hunting support, tuition exemption, and modern infrastructure. This study sheds light on the attitudes and preferences of Vietnamese undergraduate nursing students towards international study and work opportunities, highlighting the importance of such experiences for personal growth and career advancement in the nursing profession. The findings carry practical implications for educational institutions and policymakers, emphasizing the need to design programs that cater to the unique needs and preferences of nursing students seeking international opportunities.

Keywords: Nursing Undergraduates, Study Abroad, Preference, Work Abroad

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Introduction

The globalization of education and the job market has opened up new possibilities for undergraduates, especially from developing nations, seeking to explore the international landscape (Tran & Jin, 2021a). The decision to study or work abroad is a complex and multifaceted one, influenced by a myriad of factors, including personal aspirations, family expectations, financial considerations, and the perceived benefits of such experiences (Fakunle, 2021; Hung & Yen, 2020). In an increasingly interconnected world, the importance of international experiences in shaping individuals' personal and professional growth has become evident. The pursuit of study abroad (Salisbury et al., 2009) and work abroad has garnered considerable attention as a means to acquire valuable skills, foster cross-cultural competencies, and broaden horizons.

In the field of nursing, nurse migration is a phenomenon. It is common to observer many nurses migrate from Asian countries (Lorenzo et al., 2007), African countries (Clemens & Pettersson, 2008), to more developed countries. Programs such as EPA are being implemented in Japan to attract foreign nurses so far with some limited outcomes (Lan, 2018), or even disadvantaged for the future of the returnees (Kurniati et al., 2017). Language training and supporting policies are proven to be essential for the successful career of the candidates to be established (Otomo, 2022).

The genesis of this research stems from a noticeable literature gap regarding the attitudes and preferences of undergraduate nursing students in Vietnam toward international study and work prospects. Before engaging in this study, we investigated the concept of study and the intention to work in Japan in different circumstances. In previous papers, we had reported on the situation of Japanese language education in Vietnam (Tran, 2019; Tran & Jin, 2021a), studying in Japan (Tran, 2023; Tran & Jin, 2021b, 2022), and the decision to enroll in the degree programs in Japanese studies (Tran et al., 2023).

Figure 1 shows the conceptual framework proposed by the authors based on literature and previous research. Studies have shown that students who have the intention to work abroad, especially those from developing countries, usually choose study abroad as a mediating step to finding work abroad (Baruch et al., 2007). However, in some cases, undergraduates enrolled in specific programs may go for work abroad directly, such as in the field of nursing and caregiving (Ohno, 2012; Ortiga, 2014).
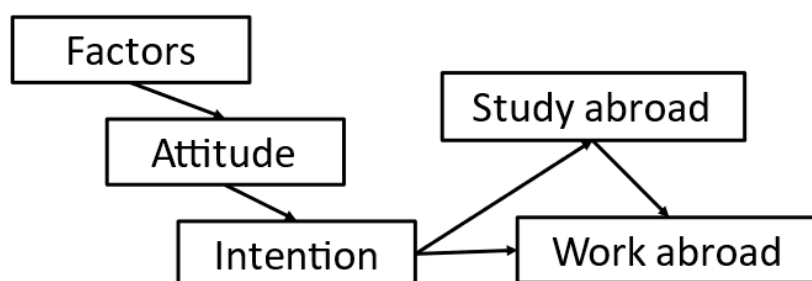
Figure 1. Conceptual framework proposed by the author.

This study is conducted in the context of a university in Vietnam specializing in healthcare (TBUMP, 2023). A foreign language is a mandatory subject in the curriculum. The special Japanese program was established for students who were willing to learn Japanese with the possibility of working in Japan after graduation if they could pass the Japanese language

requirements. Students are required to study English if they are not enrolled in a special program. This study aims to investigate the attitudes of Vietnamese undergraduate nursing students towards studying and working abroad, characteristics of the intended place to go, and the factors which may have influence on the attitude and intention to go abroad.

Methodology

This study employed a cross-sectional research design to investigate the attitudes of undergraduate students towards studying and working abroad. The target population were undergraduate nursing students at TBUMP. Data was collected in April 2023 through a web-survey questionnaire. The web-survey questionnaire was structured to obtain information in several key areas: Demographic information; Attitudes towards study and work abroad: general attitudes towards studying and working abroad, including desired duration of staying abroad; Preferred destination attributes. The questionnaire used five-level Likert-style questions from 1 to 5, where 1 stands for strongly disagree, 2 for disagree, 3 for neutral, 4 for agree, and 5 for strongly agree. The data were analyzed using IBM SPSS Statistics. Participants were provided with information about the study's purpose, their voluntary participation, and the confidentiality and anonymity of their responses.

Results

There were 147 respondents participating in the study. All participants were undergraduate students at a university in Vietnam, majoring in nursing, and were unmarried. The individual demographic characteristics (6 items). The average age of the students is 20.05 years, with a standard deviation of 1.43. Among the students, 91.2% are female, and 8.8% are male. The students are distributed across different academic years: 1st year 37.4%, 2nd year 26.5%, 3rd year 21.8%, 4th year 14.3%. There are international students (10.9%) and local students (89.1%). The students live in dormitory 21.1%, rental room 63.3%, and own home 15.6%. A third of the respondents were living alone (36.7%), while 48.3% were living with roommates, and 15.0% were living with family. The distribution of participants' family characteristics (4 items) is shown in Table 1.

Table 1. Family characteristics of participants.

Variable	Value	Total	
		n	*%*
Parents' highest education level	High school and below	122	83.0
	Undergraduate	25	17.0
Study abroad experience of family members	In Japan	19	12.9
	Not in Japan	5	3.4
	None	123	83.7
Hometown	Capital	5	3.4
	Provincial city	37	25.2
	Other	105	71.4
Perceived family income	High	2	1.4
	Mid	97	66.0
	Low	48	32.7

Table 2 shows the perceived importance of study abroad experiences in five categories: communication skills, cross-cultural competency, personal development, future income, and future career. The mean scores for each category indicate that communication skills and

cross-cultural competency are considered the most important aspects, with mean ratings of 3.70 and 3.64, respectively. Personal development follows closely with a mean rating of 3.54. Future income and Future career are perceived as relatively less important, with mean ratings of 3.40 and 3.22, respectively.

Table 2. Perceived importance of study abroad.

Important for	Mean	Median	Mode	SD
Communication skills	3.70	4.00	4	0.96
Cross-cultural competency	3.64	4.00	4	0.91
Personal development	3.54	4.00	4	0.90
Future income	3.40	3.00	3	0.96
Future career	3.22	3.00	3	0.89

Figure 2 shows over two thirds of the respondents reported a desire to work abroad for a maximum of five years, while only 8% wanted to work longer than 10 years.
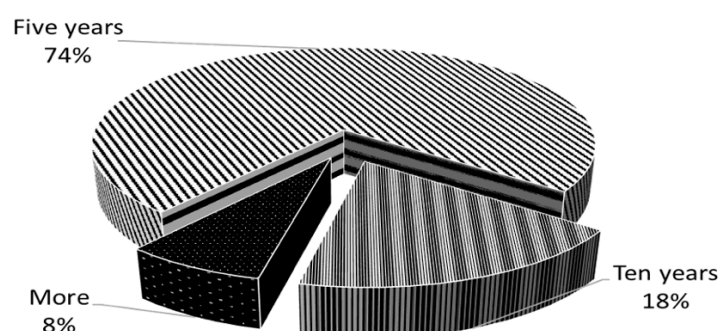
Figure 2. Duration wanted to work abroad.

Table 3 shows the location preferences for studying or working abroad. The results suggest that students generally have stronger preferences for locations with attributes such as beautiful and clean mature environments, potential long-term job opportunities, local festivals, plenty of part-time job options, tourist spots, a low cost of living in suburban areas, and friendly rural settings compared to regular students. Preference for locations with plenty of compatriots, relatives or friends were not very high.

Table 3. Location of preference for studying or working abroad.

Feature	Mean	Median	Mode	SD
Beautiful and clean nature	3.71	4	4	0.88
Potential long-term job	3.62	4	4	0.81
Local festivals	3.56	4	4	0.83
Plenty of compatriots	3.52	4	4	0.80
Plenty of part-time job	3.50	3	3	0.81
Tourist spot	3.44	3	3	0.78
Having relatives or friends	3.41	3	3	0.85
Low cost of living sub-urban	3.37	3	3	0.83
Friendly rural	3.37	3	3	0.78

The data in Table 4 presents the preferences of respondents regarding specific factors related to their preferred university abroad. The data shows that students generally have stronger preferences for universities abroad that provide tuition exemption, job hunting support,

modern infrastructure, scholarships for international students, life support and counseling services, local culture events, exchange opportunities with local and international students. The following features are moderately desired: high employment rates, dormitory facilities, free language classes, student clubs they desire, disaster prevention activities, study courses they desire. Surprisingly, features such as English-speaking environment, high rankings, national university status, offer EMI courses, or have Nobel laureates seem have less meaning for the respondents.

Table 4. University of preference abroad.

	Mean	Median	Mode	SD
Tuition exemption	3.59	4	4	0.88
Job hunting support	3.57	4	4	0.86
Modern infrastructure	3.53	4	3	0.93
Scholarship for int'l students	3.50	3	3	0.85
Life support & counseling	3.50	3	3	0.88
Local culture events	3.48	4	4	0.86
Exchange with local student	3.48	4	4	0.83
High employment rate	3.46	3	3	0.89
Having dormitory	3.46	3	3	0.85
Exchange with int'l students	3.46	3	3	0.82
Free language class	3.45	3	3	0.86
Having student clubs wanted	3.44	3	3	0.83
Disaster prevention activities	3.41	3	3	0.80
Having study course wanted	3.37	3	3	0.85
English speaking medium	3.28	3	3	0.82
High ranking	3.18	3	3	0.79
National university	3.10	3	3	0.76
Having EMI courses	3.05	3	3	0.82
Having Nobel laureates	2.94	3	3	0.82

Discussion

The present study investigates the attitudes of undergraduate nursing students in Vietnam regarding international study and work opportunities offers a comprehensive understanding of their aspirations and preferences. The study's findings underscore the transformative potential of international experiences in the nursing education landscape. These findings, particularly within the context of the distinctive Japanese language special program, have implications for both educational institutions and policy development.

The study revealed perceptions about essential role of international experiences in augmenting communication skills, cross-cultural competencies, and personal development among nursing undergraduates (O'Brien et al., 2021). The recognition of these attributes' significance highlights the comprehensive nature of nursing education, aligning students' skills with the evolving demands of the global healthcare environment. This empirical evidence may add values for educational institutions in developing countries aiming to prepare nursing students to thrive in diverse healthcare settings (Chen et al., 2020) based on race-ethnicity and country of origin (Allensworth-Davies et al., 2007).

The distinct preferences exhibited by students within the special Japanese program add an intriguing layer to the discourse. While the government-supported EPA program may not be seen as sustainable in the long run (Ogawa, 2012), other initiatives may survive and thrive (Asato, 2012). The students emphasize factors such as a pristine living environment, enduring

job prospects, and cultural festivities when contemplating international destinations. This holistic approach, emphasizing both personal and professional dimensions, underscores the interdisciplinary nature of nursing and the potential for international experiences to shape well-rounded healthcare professionals. Nevertheless, evidence has shown that foreign nurses in Japan face various challenges and difficulties, even after they return to their home countries (Abuliezi et al., 2021). The students who are prepared to head abroad may need to know and to be prepared mentally and to be trained to deals with actual issues. If the special programs could solve these issues, it may improve the sustainability of the human resources and wellbeing of foreign-educated nurses in Japan.

While nursing students in developed countries may enroll in short-term study abroad (Abuliezi et al., 2021), the chance seems very rare for students in developing countries to join such a program. The findings of the current study show that the preferences of students interested in study abroad, which in fact a postgraduate study, paint a picture of pragmatism, with a focus on institutions offering robust job-hunting support, tuition benefits, and modern infrastructure. This strategic approach aligns education with future employability, revealing students' awareness of the pivotal connection between academic pursuits and professional prospects.

Certain limitations need to be considered. The scarcity and uniqueness of the Japanese program highlight the challenge of recruiting participants, thus underscoring the limitation imposed by program availability on the generalizability of the study's findings. The cross-sectional design may overlook the evolution over time. The single-university focus might limit generalizability. Reliance on web-survey data could introduce selection bias and miss in-depth insights. Therefore, this study's limitations emphasize the potential for refined research to shape a comprehensive narrative around nursing students' global aspirations.

Conclusion

This study contributes to the literature on nursing education and global experiences by shedding light on the attitudes and preferences of Vietnamese undergraduate nursing students. By emphasizing the substantial impact of international experiences on communication skills, cross-cultural competencies, personal growth, and career prospects, the study underscores the transformative potential of such encounters. The revelations from the special Japanese program participants and the preferences of those aspiring for postgraduate study abroad add depth to the discourse. Ultimately, the findings resonate with practical implications, advocating for a tailored approach to program design and policy formulation that caters to the evolving aspirations of nursing students within the global context.

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Is Co-teaching a Sustainable Practice in Teacher Education?
Lecturers' Perception

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Abstract

The purpose of sustainability is to improve human well-being and quality of life, but the definition of sustainability may depend on context. The core of higher education is to enable academic staff to implement education that is sustainable. Therefore, ensuring sustainability in co-teaching may require providing each lecturer with the skills, knowledge, and attitudes needed to collaborate. Co-teaching is a teaching strategy in which lecturers collaborate to learn from one another's knowledge and expertise while influencing the education environment. The problem is that lecturers in higher education often collaborate in research but seldom collaborate in teaching and learning. This mixed method study investigated lecturers' experiences of co-teaching, and the strategies the lecturers have devised to promote and sustain co-teaching. The participants were 12 lecturers involved in the teaching of compulsory Educational Foundations modules at an institution of higher learning in South Africa. The findings reveal that sustainability of co-teaching at an institution of higher learning means empowering every lecturer involved in collaborative co-teaching through promoting social equity and democratic values. Although co-teaching is practiced at institutions of higher learning, it is suggested that more training on co-teaching is developed, to enable academic staff to build a sustainable future for collaborative learning settings.

Keywords: Co-teaching, Teacher Education, Sustainability, Collaborative Teaching

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Introduction

The main goal of higher education is to empower academic staff to carry out sustainability-focused education. Lecturers in higher education are at the forefront in implementing sustainable, collaborative co-teaching practices in diverse cultural context (Toledo, 2020). Therefore, to ensure the sustainability of co-teaching, it might be necessary to equip each lecturer with the abilities, information, and attitudes necessary for cooperation. Lecturers are distinctive in that they have a variety of expertise and experience and are from different cultures. The paper investigates lecturers' experiences in co-teaching, as well as pedagogical strategies in the collaborative mindset of sustainability in diverse cultural contexts. The paper begins by discussing the context of co-teaching as a sustainable practice, learning experiences in co-teaching, the theoretical framework and research methodology used for this study, perspectives on the study's contribution, and recommendations for further study.

Background

Recent debate has focused on how lecturers can be supported to make co-teaching sustainable in teacher education (Lock, Clancy, Lisella, Rosenau, Ferreira & Rainsbury, 2016, Härkki, Vartiainen, Seitamaa-Hakkarainen & Hakkarainen, 2021). The question is, how can co-teaching be implemented as a sustainable practice in teacher education? Co-teaching is a teaching method in which lecturers work together to improve the educational environment while benefiting from one another's knowledge and experience. The general curriculum, which is deemed necessary for nearly all students, can be made accessible through co-teaching (Rodriguez, 2022). Greater instructional intensity is achieved when the skills of the teachers are combined, which includes differentiating instruction for each student, and delivering instruction that is specifically tailored to their needs in different cultural enviroments (Celik, 2019). Sustainability is a fundamental aspect of collaborative co-teaching that should be included as an indicator of good teaching practices. Regarding sustainable learning processes for making progress in co-teaching, it is important that lecturers work together effectively in planning, delivering instruction and assessing co-taught classes (Rodriguez, 2022). Although co-teaching has a solid research base, there is little information on how to make it a sustainable practice in teacher education in South Africa. The paper explores lecturers' experiences in co-teaching, as well as pedagogical strategies in the collaborative mindset of sustainability in diverse cultural contexts. To achieve the purpose of the study, the following question was pursued: What are lecturers' experiences in co-teaching practices in teacher education programmes, and how can co-teaching be implemented as a sustainable practice in teacher education?

Co-teaching as a Sustainable Practice

Co-teaching is a well-known education strategy that encourages socialization, collaboration and learning at various academic levels and in a variety of subject areas, and is founded in inclusive education (Hazelitt, 2022). Several definitions of co-teaching have been developed and elaborated over the years. Co-teaching was initially developed as a method of instruction to help students who have disabilities (Morelock, Lester, Klopfer, Jardon, Mullins, Nicholas, & Alfaydi, 2017). Two or more lecturers work side by side to deliver instruction, design student assessments, and do classroom management, therefore, sharing teaching (Chitiyo, 2017). Co-teaching is an instructional learning method, in which academic staff work together to acquire knowledge and skills to shape the environment of their institution in diverse cultural context (Rabin, 2020).

Co-teaching can assume different approaches or models depending on students' education needs, and may be practiced in different contexts (Williams, 2023). The different co-teaching models are one teach, one assist; station teaching; alternative teaching; parallel teaching; and team teaching (Williams, 2023).

In order to learn more about co-teaching and the steps necessary to co-design, co-facilitate, and co-assess a graduate or doctoral-level course, Burns and Mintzberg (2019) carried out a study in Canada. They propose that co-teaching enables lecturers to experiment with various teaching pedagogies or pedagogical philosophies, create a more varied curriculum, build their confidence, and take greater risks in the classroom.

Roland and Jones (2020) used the theoretical and methodological intersection of critical performance pedagogy and critical autoethnography to analyse and contextualize classroom experiences. They found three pedagogical strategies that were effective when co-teaching challenging subjects: negotiating individual and collective space; navigating voice between collaboration and personal expression; and being aware of the role of affect in the learning environment. Collaborative co-teaching reduces lecturers' frustration, and its success is dependent on the professionalism and compatibility of those involved (Cook & Friend, 1995).

In teacher education programmes, lecturers need to provoke sustainable ways of thinking in student teachers. A modification of curricula and school programmes is crucial if student teachers are to be open-minded about participating in sustainable co-teaching practices. The traditional student teaching practicum is changed by co-teaching, into a paradigm of active collaboration, ongoing professional development, and shared leadership during teaching practice (Lenong, 2022). Therefore, developing effective, sustainable practices is crucial for student teachers who are beginning to work together in the classroom for the first time. Consequently, co-teaching practices should be sculpted for the professional development of student teachers. This suggests that effective co-teaching strategies in teacher education may entail providing lecturers and students with the abilities, drive, attitudes, and information necessary to carry out group tasks successfully.

Co-teaching and Learning Experiences

There are several benefits and positive learning experiences of co-teaching in teacher preparation programmes – also for lecturers – such as enabling them to give each student more individual attention, and to exchange professional knowledge (Sundqvist, Björk-Åman & Ström, 2021). In addition, co-teaching addresses issues, illustrates instructional strategies, supports professionals in leading or participating in professional development initiatives, shares resources, shares authority, gains fluency and forges connections with other professionals from outside organizations (Thompson, & Schademan, 2019). Graziano and Navarrete (2012) explored their individual experiences of working together and co-teaching. Because of their co-teaching experiences, they were able to reflect on their instructional strategies and students' learning. They recommend that institutions support faculty collaboration in the classroom, especially in pre-service education courses. Furthermore, in South Africa it was discovered that co-teaching within mentorship in teacher preparation provides student teachers with learning opportunities and development. Lenong (2022) conducted a study to learn about pre-service teachers' experiences with co-teaching during mentoring teaching practicums via the lens of transformative learning. The outcomes of the focus group discussion of 24 pre-service teachers revealed that pre-service teachers recognize

the relevance of co-teaching in transforming their learning during teaching practicum while working with mentor teachers.

However, there have also been reports of negative experiences of co-teaching. In their 2008 study, Dugan and Letterman looked at students' self-reported evaluations of collaborative teaching in 11 team-taught courses at three New England state universities. They found that co-teaching hampered students' ability to understand expectations clearly and achieve high grades, because of organizational and communication problems. However, students favoured team-taught courses that used co-teaching strategies. When lecturers co-teach, they must share the classroom and transition from an individual to a collaborative model of accountability and sustainable practice, which can be difficult for those who are accustomed to working alone (O'Dwyer, Hamilton & Bowles, 2020). In reviewing 17 studies on the professional development of co-teaching teams, Fluijt, Bakker and Struyf (2016) found that the interpersonal and normative aspects of team development were the main barriers to co-teachers' professionalization. In many ways, co-teaching illustrates both the potential and complexity of collaboration. The success of co-teaching is dependent on lecturers fostering collegiate, compassionate, and cooperative relations in diverse cultural contexts (Conderman, Bresnahan, Teacher, & Pedersen, 2008; Rabin, 2020).

Theoretical Framework

Transformative learning theory was used as the primary analytical framework for this article. According to the transformative learning theory, learning modifies students' frames of reference and leads to behavioural change (Mezirow, 2003). Transformative learning transformative learning is reflective, critical, emotionally adaptable, open and produces a more substantial, significant, and long-lasting learning experience in a supportive social, cultural, and physical environment (Mezirow, 2009; Halupa, 2017). One of the goals of transformative learning is to bring about social change to alter oppressive customs, beliefs, institutions, and socioeconomic frameworks and make it possible for individuals to interact with one another in diverse cultural contexts (Mezirow, 2009). Since people's expectations are not always met and things do not always turn out as they are supposed to, transformative learning theory helps people to modify their mental models and to make sense of their experiences (Mezirow, 2012). Transformative learning theory is relevant to this study because it is emancipatory and liberating for the individual as well as the community (Fleming, 2018). Because it is reflective and critical, transformative learning results in a more substantial, significant, and lasting learning experience (Halupa, 2017). Co-teaching gives lecturers the chance to change their perspectives, so they can collaborate and share knowledge in diverse cultural environments to enhance their classroom management; as a result, it has the potential to be a sustainable practice.

Methodology

The purpose of the article is to investigate lecturers' experiences of co-teaching practices in teacher education programmes and how co-teaching can be implemented as a sustainable practice. Thus, a mixed methods approach was employed to explore the lecturers' experiences of co-teaching and the pedagogical strategies used in a collaborative mindset of sustainability. To confirm findings, quantitative data was gathered first, then qualitative data was gathered that could both shed light on some of the quantitative findings and confirm the accuracy of the quantitative data. The purposive random sample comprised 12 lecturers at a university of technology in South Africa. All the lecturers were involved in co-teaching

teacher education students from first-year level to fourth-year level. Participants voluntarily completed an online questionnaire; confidentiality and anonymity were guaranteed. Ethics clearance and the required institutional authorization were obtained.

Data collection began with an initial survey that was sent to all participants. The questionnaire responses were collected and analysed using Question Pro, and the data was analysed using descriptive statistics. Frequencies were computed to ascertain participants' experiences of co-teaching. Thereafter, the participants were invited to participate in a follow-up interview. The semi- structured interviews were conducted virtually or face to face, one-on-one with each participant. The semi-structured interviews were recorded and transcribed, and the semi-structured interview data were subjected to thematic analysis. The themes were derived from the key research question.

Research Findings

The analyses indicate that participants in this investigation experienced opportunities and challenges in their experiences of co-teaching, and that the lecturers devised strategies to promote and sustain co-teaching. The researcher will present both the discussion and implications of the research in accordance with transformative learning theory. Descriptive statistics were produced from the data in the first stage, which involved the quantitative approach. In the second stage, semi-structured interview data from the qualitative phase were analysed and interpreted using text analysis.

Quantitative Data Findings

The composition of the sample of lecturers was that 70% of the respondents were women, whilst 30% were men. Only two (17%) of the participants had obtained Doctoral qualifications, while 4 (33%) had Master's degrees and 6 (50%) had Honours degrees in Education.

Summary of the Data From Questionnaire Survey

The data gathered by means of the questionnaire survey are presented below. Respondents selected their answers from a scale ranging from 1 to 4, ranging from Strongly agree, Agree, Strongly disagree to Disagree.

Table 1: Summary of responses to the questionnaire survey (N=12)

Statements per Category	Strongly agree %	Agree %	Disagree %	Strongly Disagree %
Lecturers 'experience				
I did not have knowledge on how to co-teach	90	1	1	8
I was trained on co-teaching practices before	10	0	9	81
I was never involved in co-teaching before	89	9	1	1
I enjoyed collaborating with colleagues in teacher education	92	6	1	1
I managed to experiment with various co-teaching pedagogies	85	10	2	3
I have gained co-teaching skills during teacher education collaboration	88	16	3	3
I was able to share successfully good practices during teacher education collaboration	90	8	1	1
Challenges				
Lack of communication during teacher education collaboration	88	4	3	5
A lack of resources during teacher education collaboration	60	30	5	5
Lack of knowledge and skills to collaborate during teacher education collaboration	89	8	1	2
Inadequate time to collaborate during teacher education collaboration	78	10	6	6
Sustainability				
Co-teaching requires both time and effort	78	10	6	6
Lecturers must be trained before they collaborate	90	7	1	2
Sustainability in co-teaching means equipping staff with skills	80	16	3	1
Sustainability in co-teaching means equipping staff with motivation	89	8	1	2
Sustainability in co-teaching requires active participation	85	10	2	3
Sustainable co-teaching practices leads to social change	90	7	1	2

Lecturers' Experience

It is apparent from Table 1 that lecturers' experience of co-teaching in the teacher education programme were positive. Regarding lecturers' knowledge of co-teaching practices, the majority of the respondents affirmed that they only came to know about co-teaching when they had to collaborate in the teacher education programme. The majority reported that they enjoyed collaborating, and that they shared co-teaching pedagogical practices. However, it is also apparent that few lecturers had had knowledge or skills relating to co-teaching before

embarking in collaborative co-teaching in teacher education. It is interesting that few lecturers had undergone training on collaborative co-teaching before starting to collaborate in teacher education.

Challenges
The participants agreed that lack of communication, lack of resources, lack of knowledge and skills and inadequate time are the barriers to sustainable co-teaching.

Sustainability of Co-Teaching
The third part of the survey sought information on the sustainability of co-teaching in teacher education. Table 1 shows that the majority of the respondents believed that co-teaching may be a sustainable practice in teacher education. The participants alluded the following as prerequisites for co-teaching to be a sustainable practice: it requires both time and effort, lecturers must be trained, equipped with skills, lecturers be motivated, needs active participation, and co-teaching leads to social change.

The results of the qualitative data analysis are discussed in the next session.

Lecturers' Qualitative Data
The following research questions guided the collection of qualitative data:
What are your experiences in implementing co-teaching in the classroom?
How can co-teaching be implemented as a sustainable practice in teacher education?

Experiences in Implementing Co-teaching in Teacher Education
The lecturers expressed the following statements about their experience of co-teaching practices.

Lecturer 9: *Co-teaching is a wonderful experience because you gain knowledge by working with a colleague. Training is important.*
Lecturer 4: *We collaborated well, and we had to research information about collaboration in order it to work.*
Lecturers 6: *My experience in working together was an effective one, though at first, I was a bit scared of going to class with my partner.*
Lecturer 2: *Co-teaching made things easier when we presented the lesson, planning and especially when we had to assess the students because were able to share knowledge. We came up with good practices.*
Lecturer 10: *Co-teaching is difficult at first if you didn't go for training or gained the knowledge or skills of collaboration.*
Lecturer 7: *We empowered each other, and we managed to solve co-teaching problems. But if we did go through training it could have been better.*
Lecturer 8: *Collaborative partners must be trained to effectively work together.*
Lecturer 3: *I wish there were regulations intended to educate and prepare co-teaching partners with the knowledge, disposition, and abilities necessary to carry out co-teaching practices successfully.*

A discussion of the co-teaching experiences is dealt with in the discussion section.

Implementation of Co-teaching as a Sustainable Practice in Teacher Education

Lecturers who were interviewed made various suggestions on how co-teaching can become a sustainable practice. These recommendations are captured in the following responses by lecturers.

Lecturers 5: *Empowering and equipping every member of teacher education with co-teaching skills and knowledge.*
Lecturer 1: *All parties must be committed effective co-teaching practices.*
Lecturer 8: *Lecturers must promote social equity and democratic values when working with co-partners.*
Lecturer 2: *Lecturers must use a variety of approaches, strategies, and models to meet the needs of the students.*
Lecturer 11: *Maintaining a positive relationship with another lecturer is of utmost important.*
Lecturer 7: *Co-teaching partners must create a co-teaching learning environment that engages all the students.*
Lecturer 3: *Training, training, training is important for collaboration.*
Lecturer 6: *Co-teaching must promote autonomy to make decisions.*
Lecturer 10: *Respect, effective communication and training are necessary.*
Lecturer 12: *Active participation by both partners.*
Lecturer 4: *Guidelines, policies and resources are necessary for sustainable co-teaching.*
Lecturer 9: *Lecturers need to encourage collegiate, sympathetic, and cooperative relationships for sustainable co-teaching practice.*

A discussion of co-teaching as a sustainable practice follows.

Discussion

The data from the survey and qualitative interview clearly show that co-teaching as instructional learning was a fruitful and positive learning experience for lecturers, though lecturers emphasised that, to be successful, co-teachers must be equipped with the necessary knowledge, skills, and attitudes. The lecturers enjoyed working with their colleagues in collaborative classrooms, and they were able to exchange pedagogical strategies for co-teaching. These results demonstrate that co-teaching cannot be person-centred, and lecturers need to be prepared with the knowledge, skills, and mindsets necessary for successful co-teaching (Conderman et al., 2008). Although at first co-teaching may seem like a terrifying, overwhelming task, it allows lecturers to share their best pedagogical practices and provides opportunities for learning.

The data from the qualitative and quantitative research methods concur with the findings of other researchers who also noted that, for co-teaching to be a sustainable practice, there are strategies or elements necessary, namely, it requires both time and effort and training is necessary; furthermore, co-teachers must be equipped with skills, motivation, active participation, effective communication, and respect, they must maintain positive relationships and autonomy, and they must guidelines, policies and resources, promote social equity and democratic values – then, co-teaching will lead to social change (Lock et al., 2016; Rabin, 2020). The lecturers in this study believed that co-teaching may be a sustainable practice in teacher education.

Conclusion

The article presented a mixed methods study that investigated lecturers' experiences of co-teaching practices in teacher education programmes, and asked how co-teaching can be implemented as a sustainable practice in diverse cultural contexts. The shift to sustainable practices involves a fundamental thinking-through of the basic issues of co-teaching. In teacher education at an institution of higher education, certain courses for student teachers implemented collaborative practices. The findings show that lecturers require considerable freedom or autonomy to make judgements, because they must draw on knowledge-based skills and values-based decision-making in non-routine and routine situations that are often complex and risky. Collaboration has repeatedly been found to be one of the best indicators of the adoption and sustainability of various school-based practices, including co-teaching. Lecturers' positive learning experiences of co-teaching, and the success and sustainability of co-teaching is rightfully ascribed to sharing pedagogies. To ensure the sustainability of the practices, co-partners must be trained, equipped with the necessary co-teaching skills, and motivated to use co-teaching approaches or models and techniques. The finding of this research also provides insights into designing sustainable co-teaching practices in teacher education. Therefore, higher education institutions should embrace co-teaching, and careful consideration needs to be given to training co-partners. Co-teaching has the potential to be a sustainable practice, because co-teaching gives lecturers the chance to adjust their perspectives, so they can work together and share knowledge to improve their classroom practices and enhance student learning. Co-teaching increases lecturers' awareness of social concerns, but different cultural experiences and backgrounds may generate resistance to change; hence, for co-teaching to be sustainable, lecturers must build new meaning perspective that permit transformative learning. From a South African perspective, the study provides insight into lecturers' experiences in co-teaching, as well as pedagogical practices in the collaborative mindset of sustainability in varied cultural contexts and has major implications for teacher education.

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Conducting Workplace-Based Assessment in Undergraduate Training: What We Have Learned From Failures?

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Abstract

In outcome-based education, workplace-based assessment (WPBA) should accurately provide stakeholders with evidence of learner competencies. In undergraduate training (UGT), mini-clinical evaluation exercises (mini-CEX) and direct observation of procedural skills (DOPS) accurately reflect learner performance. The portfolio is far from an independent WPBA tool. This paper summarizes changes in the WPBA strategy for UGT during UMP curriculum renovation and discusses solutions that might improve WPBA validity. In the 2010s, the UMP began to build an accurate and suitable WPBA strategy. The first edition included four specific mini-CEXs and two specific DOPS. It enhanced learner performance but increased educator workload, therefore provoking negative educators' reactions. The second edition had one multipurpose mini-CEX. Its complexity negatively impacted learner orientation and educator acceptance. Digitalization characterized the third edition and aimed to improve user acceptance and database management. The educator workload was the main obstacle to running this edition. We removed DOPS from the two last WPBA editions due to license requirements. To date, we still consider that portfolio is for formative purposes. From the learned failures, we imagine solutions can improve our WPBA validity. Mini-CEX is still the primary tool, and portfolio is a secondary one. A series of specific mini-CEX seems better than one 'all-in-one'; mini-CEX should use detailed rubrics, which enhance the correlation score-performance; flexible agenda gives learners autonomy; preparing educators to conduct mini-CEX is mandatory. Concerning the portfolio, we prioritize crafting a comprehensive user guide and removing unnecessary fields from the current portfolio. Digital design and management allow ubiquitous use.

Keywords: Workplace-Based Assessment, Mini-Clinical Evaluation Exercise, Portfolio

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Introduction

Outcome-based education (OBE) characterises modern higher education. It targets standardised proficiency levels and aims to guarantee that all learners have a sufficient level of proficiency at the end of training. Through practising, learners acquire and develop professional competencies. Entrustable professional activities (EPAs) are units of professional practice; defined as tasks or responsibilities to be entrusted to the unsupervised execution by a trainee once the trainee has attained sufficient specific competence [10]. In OBE, it is crucial that curriculum developers ensure the alignment between assessment and expected learning outcomes (ELO). Assessment should accurately provide stakeholders with evidence of learner competencies, so it requires conducting various workplace-based assessment methods (WPBA) together [1].

In competency-based medical education (CBME), assessments could be simulation-based or workplace-based. The objective structured clinical examination (OSCE) is a series of simulations for assessing learner performance of basic skills (especially taking history, counselling and making decisions). Available evidence supports using OSCE as a primary simulation-based strategy for evaluating learner performance at the 'show' level [8]. Educators agree that, if conducted for assessing the first EPA milestones, OSCE is reliable and has constructive validity. Unfortunately, OSCE seems likely not suitable for assessing advanced EPAs. In real-life conditions, WBPA tools replace OSCE as an appropriate assessment strategy. WPBA seems suitable for assessing advanced EPAs but faces several issues related to its validity. Educators should not use a single WPBA for concluding or judging learner performance [5, 7]. Mini-clinical evaluation exercises (mini-CEX), direct observation of procedural skills (DOPS), portfolio, and case-based discussion (CBD) are the most popular WPBA tools. Available evidence demonstrates that mini-CEX and DOPS accurately reflect undergraduates' performance [2, 6], CBD seems likely not suitable for undergraduate training, and the portfolio is far from an independent WPBA tool.

Methods

This paper presents the UMP's experiences in implementing a variety of WPBA, lessons that the UMP have learned and discusses potential solutions that might improve the validity of WPBA.

Results

Table 1: Assessment in CBME. Comparison of simulation-based and WPBA		
	Simulation-based	**Workplace-based**
Conducting environment	Simulation	Real-life
Assessment tools	OSCE	mini-CEX, DOPS, CBD, portfolio
Standardisation	Standardised	Non-standardised
Validity	Reliable	Context dependant
Examiners	Educators	All stakeholders
Examinees	Novices, beginners	All EPA milestones
Subject characteristics	Simulated	Real being
	Realistic scenario	Authentic
	Simplified scenario	Multifaced

Mini-Clinical Evaluation Exercises (Mini-CEX)

The mini-CEX is a formative assessment tool that aims to provide learners feedback on skill performance in medical care; by observing an actual clinical encounter. Mini-CEXs should accurately evaluate learner performance and provide them with valued feedback on their performance. Conventionally, each mini-CEX should target a specific skill, use detailed rubrics and allow educators to provide relevant feedback to learners. The examined skills could be taking history, counselling or making decisions; rubrics could be analytical or holistic; feedback could be informal or formal, given by educators or peers [2].

Table 2: Continuous changes in the mini-CEX for UGT during UMP curriculum renovation			
	First edition	**Second edition**	**Third edition**
Mini-CEX	4 specific mini-CEXs Multiple attempts are not allowed	1 all-in-one mini-CEX Second attempt is allowed	1 all-in-one mini-CEX Second attempt is allowed
DOPS	2 specific DOPSs Multiple attempts are not allowed	DOPS removed Due to legal issue	DOPS removed Due to legal issue
Rubrics	Analytical, simplified Analytical only	Analytical, detailed Analytical only	Analytical, detailed Holistic for referencing
Feedback	Informal or formal Non-registered	Formal Registered	Formal Registered
Format	On A_5 sheet	On A_4 sheet	Digital or on A_4 sheet
Exam agenda	Flexible Learner's decision, learners' request	Fixed According to course agenda	Fixed According to course agenda
Inference	Scoring Generalisation possible	Scoring Generalisation impossible	Scoring Generalisation impossible
Acceptance rate	Moderate to high	Low to moderate	Low to moderate
Correlation M-CEX/OSCE	Good	Moderate	Moderate

The First Edition (2013)

Knowledge-based education dominated the UMP pedagogical approach until the 2010s. Before this date, case presentation was the sole WPBA tool for assessing learner performance at the end of their clinical clerkship. In the early 2010s, there was a shift from knowledge-based education to OBE, so the Department of Obstetrics and Gynaecology has to set up a modernised WPBA toolkit.

The first edition of WPBA (2013) addressed undergraduates completing their obstetrics clerkship. That included four specific mini-CEXs and two DOPSs. Those mini-CEXs targeted taking history (one mini-CEX), counselling (one mini-CEX) and examination skills (two mini-CEXs); used simplified three-level analytical rubrics (underperformance/meet requirements/better than expected); usually provided informal feedback. As formative tests, learners used those mini-CEXs for self-awareness, peer evaluation and formative purposes. They should continuously use mini-CEX until feeling ready to pass the final examination. We let learners decide when they pass the mini-CEX. As a summative test, we used scoring as a sole inference. This first WPBA attempt immediately impacted the teaching-learning processes. Positively, learners knew what they should learn and how they should perform to reach ELOs. The given autonomy encouraged learners to learn accountably.

There was a net enhancement in learner accountability and task performance. Unfortunately, implementing it provoked negative educators' reactions. We experienced a considerable increase in educator workload. Examiners should spend two working hours to complete this six-WPBA set (summative only, formative excluded). That finally encountered three hours of extra work per educator per week. That consequently led this attempt to its rejection.

The Second Edition (2016)

In 2016, we completed preparing and launched the renovated obstetrics-gynaecology course. This CBME course uses team-based learning (TBL) as a principal pedagogical approach; includes three modules (approximately 12 credits); distributed over three academic years (year 3rd, year 4th, and year 6th). Learners start this long-haul course with a pre-clinical integrated module (year 3rd) and then continue with two clinical interdisciplinary modules (year 4th and year 6th).

The second edition did not include DOPS due to changes in legal regulations. We have chosen mini-CEX as a WPBA tool for assessing real-life clinical performance and OSCE for assessing clinical performance and reasoning. There were changes in the mini-CEX format. The two clinical modules shared one multipurpose mini-CEX. This 'all-in-one' mini-CEX targeted mixed purposes, both formative and summative. It aimed to assess taking history, counselling and examination skills; used rating scales rubrics (one to ten); provided formal feedback. We encouraged learners repeatedly use mini-CEX for self-awareness or peer evaluation before passing the formative examination, which uses the same tool. Learners had to complete this mini-CEX quintuple (four without scoring and one with scoring) and follow the fixed exam agenda. In this edition, we continued to consider scoring as a sole inference.

Those changes have raised issues of learner accountability and human resources. We experienced the negative impact of the 'all-in-one' format on learner orientation. Learners felt disoriented due to its complexity. On the other hand, it seemed that the fixed exam agenda provoked pressure on learners. Some learners were not ready yet at the 'mini-CEX day'.

Learner disorientation and working under pressure negatively impact learner performance. Examiners should spend three working hours on the 'mini-CEX day', which finally encountered two hours of extra work per educator per week. Additionally, educators were not at ease when using 'all-in-one' rubrics. Those negative impacts led to a poor correlation between mini-CEX scores and OSCE results.

The Third Edition (2019)

In 2019, we attempted to edit our WPBA toolkit. There was no change in course syllabi. Two key features of this new edition are the digital mini-CEX and portfolio, those aimed to improve the formative effectiveness and acceptance rate of the pre-existing mini-CEX. We developed a ubiquitous tool possessing a user-friendly interface, able to put users at ease when processing WPBA. Digitalisation also aimed to improve database management.

Unfortunately, user feedback was generally negative. Network accessibility seemed likely the main obstacle to running digital mini-CEX. Issues related to the 'all-in-one' mini-CEX, such as the complexity and lack of specificity, remained unsolved. Again, time consumption discourages educators from running digitalised mini-CEX.

Discussion

Learner autonomy: Mini-CEX is the most popular formative assessment. Its contribution to assessing primary clinical skills performance and giving feedback is indisputable [2, 6]. In formative assessment, it is crucial to give learners autonomy in learning [10]. Respecting learner autonomy characterised the 2013' edition. In the 2013' edition, learners have decided when they pass their mini-CEX. Autonomy in timing has allowed learners to adjust their learning plan and continuously repeat the given task until feeling ready to pass the final examination. Hence, learners have given positive feedback on the 2013' assessment process. In 2016, there were changes in the course syllabi, which included a reduction in course duration (eight weeks instead of ten weeks) and a fixed mini-CEX date (on the Friday of the 5th week), that consequently advancing the exam day by two weeks and limiting the learner autonomy. Adversely, at the due date, some learners were not ready yet to pass mini-CEX. The limited learner autonomy has led to a decrease in their accountability and changed their mindsets. Hence, learners have shifted from 'practising for learning' to 'passing the exam'. Introducing technology into the third edition (2019) could not change the nature of the issue, so it did not improve the learners' attitude. We experienced the importance of giving autonomy to learners in ensuring their accountability, therefore suggest applying a flexible agenda rather than fixing the examination date.

Mini-CEX format: In OBE, elucidating the learning objectives is mandatory. Learners, especially novices, attempt to use rubrics for self-directing and improving task performance [2, 6]. The 2013' edition included specific mini-CEXs containing simplified rubrics, which provided learners with an effective self-learning tool and an accurate peer-evaluation tool. The 2016' edition used the 'all-in-one' mini-CEX instead of a specific mini-CEX, so unable to direct the novices. The digitalised edition (2019) has encouraged self-learning and improved its effectiveness by introducing detailed rubrics. Hence, we suggest designing a series of specific mini-CEX that contain detailed rubrics rather than an 'all-in-one' mini-CEX using the Likert scale.

Educator perspectives: There is a conflict between learner benefits and educator workload. Our experiences demonstrate that excessive workload is the most problematic issue. Educators must observe the entire performance and provide learners with feedback. Completing each specific mini-CEX requires at least fifteen minutes, which means more than one hour per student per course. Time consumption is inevitable. On the other hand, completing mini-CEX is mandatory. Therefore, applying flexible exam agenda, which allows for adjusting educator and learner work plans, seems likely an appropriate solution.

There is also a conflict between learner needs and educator comfort. Detailed rubrics support learner self-awareness and peer evaluation processes. Inversely, going into details makes the rubrics complicated and unfriendly. Additionally, the 'all-in-one' format contains several rubrics inside one mini-CEX, which makes the mini-CEX much more complicated. The complexity of the 'all-in-one' configuration also negatively impacts its ability to direct self-learning. We suggest breaking down the 'all-in-one' mini-CEX into a series of specific mini-CEX. It could enhance the educator acceptance rate and improves learning effectiveness.

Direct Observation of Procedural Skills (DOPS)

Our 2013' WPBA toolkit contained two DOPS, which included delivering a baby and suturing episiotomy; promoted scoring and generalisation inferences. Those DOPS played a crucial role in training essential obstetrical skills and received stakeholders' positive feedback. Since 2014, Vietnamese law has required a license to perform patient care procedures. According to that, undergraduates could not perform patient care procedures unless being under supervision when doing procedural skills. In 2016, at UMP, the educator-to-learner ratio was 1:20. This poor ratio did not allow educators to ensure safe supervision. Therefore, in 2016, we had to remove the two DOPS from the 2013' WPBA toolkit.

To date, we still consider the importance of these essential procedural skills and attempt to bring them back to our WPBA toolkit when reaching the appropriate educator-to-learner ratio.

Case-Based Discussion (CBD)

The case-based discussion (CBD) takes part in WPBA and mainly targets the ability to make decisions and think critically. In CBD, examinees should perform a series of tasks, which include taking history, performing a clinical examination, making decisions, and having face-to-face discussions with examiners. CBD does not target assessing knowledge. During the discussion, the examinee should present individualised and evidence-based management solutions. Evidence suggests addressing CBD to advanced learners (e.g. competent, proficient) rather than novices (e.g. novice, beginner) [7, 9].

Before 2010, we used case presentations for validating undergraduate clinical clerkship. Case presentations are different from CBD. It uses a given case as a context for the Q&A session rather than as a subject for managing; targets knowledge rather than clinical reasoning. Hence, in our current undergraduate curriculum, we consider using structured oral exams (SOE) to assess knowledge acquisition rather than case-based discussions to assess task performance.

Portfolio

Until 2016, we used the logbook to monitor learners' task performance and did not use the portfolio as a WPBA tool. It aimed to provide evidence of learner performance rather than support learners' competency judgement. In 2016, the OBE curriculum replaced the knowledge-based curriculum. Implementing it required radical adaptations, which included WPBA.

In 2019, we introduced a portfolio into our WPBA toolkit. This portfolio included a user guide, a learner diary, educator feedback and a holistic evaluation. It targeted supporting learner self-awareness rather than providing evidence for judging task performance [5]. Unfortunately, users were unfamiliar with the portfolio, which led to its transformation back to a logbook. Learners often filled the portfolio with cases instead of their feelings, while educators often gave marks instead of formal feedback. Consequently, educators could not use this portfolio as an inference, and the portfolio lost its validity in judging learner performance, as demonstrated by Driessen, Buckley and Yoo [4, 3, 11].

To date, we still consider that portfolio is for formative purposes. We ask learners to complete their portfolios adequately. On the other hand, we are now attempting to redesign our 2019' portfolio. The new portfolio should target learner self-awareness rather than providing evidence of task performance. We consider a comprehensive user guide elucidating the purposes of completing the portfolio and its requirements. We also consider removing unnecessary fields from the current portfolio.

Conclusion

From the failures that we have learned, we consider that it is mandatory to reform our current WPBA strategy. We imagine some solutions can improve the validity of our WPBA toolkit. Mini-CEX is still the primary tool, while a portfolio could be a secondary one. Concerning mini-CEX, a series of specific mini-CEX seems likely better than the 'all-in-one' mini-CEX; specific mini-CEX should use detailed and valid rubrics, which enhance the correlation between the examination score and learner performance; applying flexible exam agenda gives learners autonomy and sounds helpful; preparing educators to conduct mini-CEX is mandatory. Concerning the portfolio reform, we prioritise crafting a comprehensive user guide and removing unnecessary fields from the current portfolio. We also support digital design and management. Doing that allows ubiquitous use and effective management.

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Teachers and Students' Perspectives in Current State, Problems and Needs of Multicultural Learning in Malay Language Communication in the Southernmost Region of Thailand

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Abstract

This research aimed to explore the teachers and students' perspectives in current state, problems and needs of multicultural learning in the Malay language communication subject at the secondary in Narathiwat province. Data was collected by the questionnaires from 33 secondary school teachers and 36 students under of the Narathiwat Secondary Educational Service Area Office. Data was analyzed by mean and standard deviation (SD). The results indicated that, in overall, teachers held a high level of opinions regarding the current state (mean = 3.69, SD = 0.63), moderate level of opinions regarding the problems (mean = 2.89, SD = 0.73) and high level of opinions regarding the needs (mean = 4.14, SD = 0.79) of multicultural learning in the Malay language communication. In addition, in overall, students held a high level of opinions regarding the current state (mean = 4.03, SD = 0.68), moderate level of opinions regarding the problems (mean = 2.90, SD = 0.73) and high level of opinions regarding the needs (mean = 3.85, SD = 0.75) of multicultural learning in the Malay language communication. The teachers and students held the perspectives in current state, problems and needs of multicultural learning in the Malay language communication in the same direction.

Keywords: Perspectives, Current State, Problems, Needs, Multicultural Learning, Malayu Language Communication

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Introduction

Thailand stands out as a nation marked by a rich tapestry of diversity, encompassing a wide array of ethnicities, languages, religions, customs, and ways of life, particularly in regions contiguous to its neighboring countries. This commitment to diversity is enshrined in the constitutional framework of the Kingdom, specifically articulated in Article 70, Section 5 of the Constitution of the Kingdom of Thailand B.E. 2560 (2017) (p. 18). This constitutional provision underscores the pivotal role of the state in fostering an environment that safeguards and promotes the rights of Thai citizens hailing from diverse ethnic backgrounds. It emphasizes their entitlement to live harmoniously within society in accordance with their respective cultures, traditions, and original lifestyles. This liberty is extended, provided that such expressions of diversity do not compromise public order, moral values, or present a threat to the security and public health, as elucidated in the Constitution of The Kingdom of Thailand (2017). In essence, Thailand's constitutional framework manifests a dedication to preserving the myriad cultural identities within its borders while upholding the broader interests of societal well-being. Furthermore, the National Education Act B.E 2542 (1999), as amended (2nd edition) in 2002, Article 10 Section 2 on Education Rights and Responsibilities, specifies that "…educational management must ensure that individuals have equal rights and opportunities to receive basic education for a minimum of twelve years, provided universally and with quality, without charge" (Office of the National Education Commission, 2002, p. 7).

The evolution of the education system, with a focus on fostering acceptance of diversity, acknowledging its inherent value, and underscored by an emphasis on the significance of involvement in various professions and stakeholders, is an integral component of the national objectives delineated in the National Education Plan (2017-2036).

> The plan addresses the increasing trends of conflicts and violence in society, the refusal to accept differing opinions, and the aggressive behavior of certain individuals spreading across various countries. The rise in conflicts of opinion within society results in unrest, leading to citizen apprehension and a lack of safety in life and property. (pp. 17-18)

Envisaged within the framework of the National Education Plan (2017-2036), the strategic blueprint for education management to fortify social stability and uphold national security. The southern border provinces of Thailand exhibit distinct characteristics in language, religion, and culture, necessitating a concerted effort to promote and support the education of multicultural societies. The Southern Border Provinces Development Strategy for the years 2022-2024 advocates for the advancement of multicultural understanding, national history, and local history through the formulation of curricula. This educational approach is designed to underscore the significance of comprehending multicultural societies, national history, and local history within the southern border provinces, with a pronounced emphasis on fostering unity and harmony among the diverse population.

Integral to this initiative is the enhancement of the identity and individuality of the people in the southern border provinces. This involves not only the promotion of Thai language but also the cultivation of proficiency in the Malay language, English, and other pertinent foreign languages at all educational levels. These linguistic skills are positioned as essential tools for communication, daily life, career development, and establishing connections with the Malay world, Arab world, and the broader international community. Thus, the strategy encapsulates a comprehensive approach to education that aligns with the distinctive characteristics of the

southern border provinces while concurrently fostering a sense of unity and interconnectedness within the broader regional and global context.

The southern border provinces of Thailand possess distinctive characteristics in terms of language, religion, and culture. Therefore, it is crucial to promote and support the learning of multicultural societies, as outlined in the Southern Border Provinces Development Strategy for the years 2022-2024, on page 13. The strategy provides 12 development directions, and one of them specifies: "Promote and support the learning of multicultural societies, national history, and local history through the development of curricula that emphasize the understanding of multicultural societies, national history, and local history in the southern border provinces, emphasizing the creation of unity and harmony among people in the area. Enhance the identity and individuality of people in the southern border provinces, including promoting the learning of the Thai language, Malay language, English, and other important foreign languages at all levels of education as tools for communication, daily life, career development, and relationships with the Malay world, Arab world, and international community" (Southern Border Provinces Development Strategy 2022-2024, pp. 11-12).

The Core Curriculum for Basic Education B.E. 2551 (2008) strategically organized learning management into eight subject groups, with Foreign Languages standing out as a pivotal category. This inclusion is notably influenced by the regional context of the southern border provinces adjacent to Malaysia, where Malay serves as the second foreign language. The central Malay language, specifically, plays a prominent role as a widely utilized means of communication in this region and stands as one of the primary languages within the ASEAN community.

Malay, whether referred to as Bahasa Malaysia in Malaysia or Bahasa Indonesia in Indonesia, Bahasa Melayu in Brunei, parts of Singapore, the Philippines, Myanmar, Cambodia, and the southern region of Thailand (in the form of the local Malay language), holds significance. Notably, its distinction lies in its use of the Roman alphabet, shared with English, and its straightforward language structure. The Core Curriculum acknowledges the pragmatic aspects of learning Malay, given its simplicity and widespread usage. Beyond regional borders, the utility of Malay extends, contributing to its potential as a lingua franca within the ASEAN community. This multifaceted language not only eases communication but also fosters an enhanced understanding of diverse lifestyles, cultures, and traditions across the region. Such linguistic inclusivity aligns seamlessly with the overarching vision of "One Vision, One Identity, One ASEAN Community," promoting unity and mutual comprehension within this dynamic and culturally rich collective (Prasert Yenprasit, 2013).

The Multi-cultural Literature Learning Model (McLL) can be flexibly incorporated into classrooms through diverse methods, aiming to enhance multi-cultural literature learning. One effective approach involves the utilization of Malay literature as a means to foster career-based communication. Nevertheless, an examination of the literature related to education in Thailand underscores a notable gap in research dedicated to exploring the current state, problems and needs concerning the McLL. Consequently, the researchers are motivated to delve into an inquiry aimed at comprehensively understanding the current state, problems and needs concerning the implementation of McLL in grade 11 level.

Research Questions

The research questions of this study were as follows: a) What are the current state, problems, and needs related to multicultural literature learning? b) What are desirable characteristics of the new McLL model emphasized career-based communication for teaching the Malay for Communication subject for grade 11 students?

Research Objectives

The research objectives of this study were two folds: a) to explore the current state, problems, and needs related to multicultural literature learning in Malay language educational context of Thailand; and b) to create a new Multi-cultural Literature Learning (McLL) model emphasis on career-based Malay communication for grade 11 students.

Literature Review

In this section, the authors reviewed the literature related to multicultural learning as follows.

Multicultural Learning

Multicultural Education is a concept that arose from the need to serve the diversity of races, classes, genders, languages, values, and beliefs in education. Multiculturalism is the social capital of cultural learning. It is an educational opportunity for learners from diverse cultures to learn together by developing positive values about cultural differences, and encouraging learners to develop their ability to learn in society happily. There is linguistic diversity within ethnic groups, using their own dialects as part of their identity, such as the local Malay, Thai Southern Jehe, and the Central Thai language; and there is also variation based on the accent of each locality. There is a diverse beauty that comes with the language exchange in learning the Malay language through use of literature as a medium of learning.

Literature is something that is expressed in the language of creation by humans through the imaginative process that aids in human communication, whether written or oral, in prose and poetry – a valuable asset contained within the elements of literature. Clearly, literature is thus the key in many ways, whether in Interdisciplinary learning, a model of learning management based on multicultural literature, and in multicultural literature alone is thus critical for learning in the 21st century era that emphasizes various skills. Teachers have emphasized professional communication skills in particular to develop effective learning management Cultural learning management places a pronounced emphasis on the integration of skills in a world where technology assumes a pivotal role. The conventional confines of learning, tethered to textbooks within classroom walls, have given way to a more expansive approach. In this paradigm, the learning experience transcends traditional boundaries, enabling access to information and educational resources on a global scale through the vast expanse of the internet. The overarching goal of this approach is to transform learning into an experience that seamlessly aligns with the unique interests and needs of each individual learner.

As technology solidifies its status as an indispensable tool, its integration into the learning process becomes imperative. Learners today don't solely rely on traditional textbooks; they also harness the power of the internet to access a wealth of information and educational resources on a global scale. Offering students the opportunity to leverage technology for creating works that manifest their knowledge and creativity is not just beneficial but essential.

Within the realm of cultural learning, a pivotal aspect lies in the development of skills across diverse learning styles. This acknowledgment underscores the importance of fostering adaptability and proficiency in various approaches to learning, recognizing that individuals may engage and interact with information in unique ways.

Cultivating proficiency in various learning styles constitutes a foundational element of cultural learning management. This approach goes beyond merely promoting self-directed learning and the use of technology; it also places a strong emphasis on nurturing critical thinking, problem-solving, communication, and collaboration skills through both formal and informal educational activities. The goal is to equip students not only with academic knowledge but also with the essential abilities to confront diverse perspectives and challenges that life presents. Recognizing the paramount importance of adaptability in our rapidly evolving world, cultural learning management further prioritizes the development of emotional intelligence, teamwork skills, and effective problem-solving capabilities. This strategic focus enables learners to adeptly navigate and adapt to changing situations, ensuring that they emerge not only academically proficient but also well-prepared to tackle the multifaceted challenges of life in the more complex world.

In summary, multicultural learning emerges as a response to the dynamic landscape of education in the digital age, where the pivotal roles of technology, adaptability, and diverse learning styles come to the forefront. The principles and concepts delved into in this research strive to be instrumental in shaping a more comprehensive and effective approach to education within the context of the contemporary world.

Research Methodology

This research employed survey research that targeted two distinct participant groups: teachers and students actively engaged in the teaching or learning of Malay Language within the multi-cultural classroom context. There were 33 teachers participated in the survey of current state, problems and needs of teaching with multi-cultural learning. They all had experience in teaching with multi-cultural learning for more than five years. In addition, 36 grade 11 students, who already had experience with multi-cultural learning classroom, were asked to respond to the survey of current state, problems and needs of teaching with multi-cultural learning. The participating teachers and students were affiliated with Narathiwat School under the jurisdiction of the Office of the Secondary Educational Service Area of Narathiwat.

Data Collection

To collect quantitative research data, the researchers utilized a questionnaire about the current state, problems, and needs in multicultural learning management. The items of Current State, Problems, and Needs in Multicultural Learning Management Questionnaire for teachers were five-level rating scale, which consisted of three main parts: a) Background of a respondent (3 items); b) Current state, Problems, and Needs in Multicultural Learning Management (21 items); and c) Suggestions for further improving multicultural learning management (1 open-ended item). In addition, the items of Current State, Problems, and Needs in Multicultural Learning Management Questionnaire for students were five-level rating scale, which consisted of three main parts: a) Background of a respondent (2 items); b) Current state, Problems, and Needs in Multicultural Learning Management (22 items); and c) Suggestions for further improving multicultural learning management (1 open-ended item).

Data Analysis

The researchers conducted an analysis of respondents' background data obtained from Part 1 of the questionnaire by tabulating frequencies and calculating percentages. Ratings from the five-level scale were interpreted as follows: Very High = 5, High = 4, Moderate = 3, Low = 2, and Lowest = 1. Then, the data from Part 2 was analyzed by calculating for mean and standard deviation (SD). The interpretation of mean ranges from each item in Part 2 of the questionnaire followed the guidelines outlined (Wongratana, 2007): 4.50 - 5.00: Indicates that the current state, problems, and needs were at a Very High level and 3.50 - 4.49, 2.50 - 3.49, 1.50 - 2.49, and 1.00 - 1.49 being interpreted as a High, Moderate, Low, and Very Low levels. Furthermore, the qualitative data Part 3 was subjected to content analysis.

Results and Discussion

The research results in accordance with the research questions as follows:

Teachers' Perspectives about Current State, Problems, and Needs in Multicultural Learning

From the survey of teachers' perspectives on the current state, issues, and needs in multicultural learning, there were 33 teachers responded to the survey. Predominantly, the respondents were female, constituting 72.7% of the sample. A breakdown by educational levels revealed that 51.50% of the participants were teachers from upper-secondary education (grades 10-12), followed by those from tertiary education (27.30%) and lower-secondary education (21.20%). The teachers' perspectives on the current state, issues, and needs in multicultural learning were presented in Table 1.

Item	Aspect	Mean	SD	Interpretation
Current state				
1.	Multicultural learning (ML) is suitable for school.	3.97	0.88	High
2.	ML is suitable for students.	4.03	0.92	High
3.	ML is important.	4.24	0.87	High
4.	ML is beneficial.	4.09	1.01	High
5.	A school administrator supports ML in school.	4.09	0.95	High
6.	Teachers support ML.	3.94	0.90	High
7.	The content of Malay language communication is suitable for ML.	4.30	0.73	High
8.	ML can develop students' central Malay language communication skills.	4.27	0.76	High
9.	ML management can develop students' career-based communication skills.	4.09	0.91	High
10	ML can raise students' awareness of cultural diversity.	4.15	0.75	High
	Overall average	**4.12**	**0.68**	**High**
Problems				
11.	The school is not yet ready for ML management.	2.67	0.96	Moderate

12.	Teachers are not yet ready for ML management.	2.70	1.07	Moderate
13.	Students are not yet ready ML management.	2.64	0.99	Moderate
14.	It is difficulty to conduct ML in my classroom context.	2.82	0.95	Moderate
15.	There is a lack of support from a school in ML management.	2.88	1.14	Moderate
16.	There is a lack of ML resources.	3.12	1.02	Moderate
17.	There is a lack of technology for ML.	3.03	1.14	Moderate
18.	There is a lack of ML resources.	3.18	1.18	Moderate
19.	Conducting ML takes too much time.	3.00	1.12	Moderate
	Overall average	**2.89**	**0.84**	Moderate
Needs				
20.	You want to keep ML management in your classroom.	4.24	0.79	High
21.	You want to keep ML in your school.	4.03	0.95	High
	Overall average	**4.14**	**0.79**	**High**

Table 1: Teachers' perspectives on the current state, problems and needs in multicultural learning

From Table 1, in overall, the teachers regarded the current state of multicultural learning at a high level (mean = 4.12, SD = 0.68). The top three items of current state, which were rated in a high level, were: Item 7: The content of Malay language communication is suitable for multicultural learning (mean = 4.30, SD = 0.73); followed by Item 8: Multicultural learning can develop students' central Malay language communication skills (mean = 4.27, SD = 0.76); and Item 3: Multicultural learning is important (mean = 4.24, SD = 0.87).

In addition, the responding teachers reflected a moderate level of problems in multicultural learning (mean = 2.89, SD = 0.84). The top three items of problems, which were rated in a moderate level, were: Item 18: There is a lack of multicultural learning resources (mean = 3.18, SD = 1.18); followed by Item 16: There is a lack of multicultural learning resources (mean = 3.12, SD = 1.02), and Item 17: There is a lack of technology for multicultural learning (mean = 3.03, SD = 1.24). In addition, the teachers stated a high level of needs of multicultural learning (mean = 4.14, SD = 0.79). They reflected that they highly needed to keep multicultural learning in their classroom (mean = 4.24, SD = 0.79) and schools (mean = 4.03, SD = 0.95).

Students' Perspectives About Current State, Problems, and Needs in Multicultural Learning

Of 36 students responded to the survey, the participating students were predominantly female, making up 82.9% of the respondents. Of all participants, 71.4% were 17 years old, 25.7% were 16 years old, and 2.9% were 15 years old. The students' opinions regarding the current state, problems, and needs in multicultural learning can be presented as Table 2.

Item	Aspect	Mean	SD	Interpretation
Current state				
1.	Multicultural learning (ML) is suitable for school.	4.06	0.84	High
2.	ML is suitable for students.	3.80	0.87	High
3.	You agree with ML.	4.00	8.80	High
4.	ML is suitable for the content of Malay language communication.	4.06	0.80	High
5.	ML is beneficial.	4.17	0.89	High
6.	ML is important.	4.09	0.78	High
	Overall average	**4.03**	**0.68**	**High**
Problems				
7.	The school is not yet ready for ML management.	2.97	0.92	Moderate
8.	Teachers are not yet ready for ML management.	2.80	1.02	Moderate
9.	Teachers lack skills in teaching with ML.	2.51	1.07	Moderate
10.	Teachers did not utilize enough technology in ML.	2.80	0.99	Moderate
11.	Students are not yet ready for ML.	2.91	0.85	Moderate
12.	Students have not yet developed sufficient communication skills in the central Malay language communication subject.	3.03	1.01	Moderate
13.	Students have not yet developed sufficient career-based communication skills in the Malay language communication subject at a satisfactory level.	3.00	0.84	Moderate
14.	Students have not yet developed a satisfactory level of awareness of cultural diversity in the Malay language communication subject.	3.14	1.06	Moderate
	Overall average	**2.90**	**0.73**	**Moderate**
Needs				
15.	The school should prepare more for ML.	3.86	0.94	High
16.	Teachers should develop readiness for multicultural learning.	3.74	1.07	High
17.	Teachers should enhance skills in ML.	3.74	1.01	High
18.	Teachers should increase the use of technology in ML.	3.83	0.89	High
19.	Students need to be developed their readiness for ML.	3.91	0.85	High
20.	Students need to develop central Malay language communication skills.	3.86	0.94	High
21.	Students need to develop career-based communication skills in the Malay language.	3.83	1.04	High
22.	Students need the develop of awareness of cultural diversity in the Malay language communication subject.	4.00	0.94	High
	Overall average	**3.85**	**0.75**	**High**

Table 2: Students' perspectives on the current state, problems and needs in multicultural learning

In summary, students stated the current state of multicultural learning at a high level (mean = 4.03, SD = 0.68). The three highest-rated items in the current state were: Item 5: Multicultural learning is beneficial (mean = 4.17, SD = 0.89); followed by Item 6: Multicultural learning is important (mean = 4.09, SD = 0.78); and Item 4: multicultural learning is suitable for the content of the Malay language communication subject (mean = 4.06, SD = 0.80). These three items were rated in a high level.

In addition, the students reflected the problems of multicultural learning in a moderate level (mean = 2.90, SD = 0.73). The top three problems of multicultural learning were: Item 14: Students have not yet developed awareness of cultural diversity in the Malay language communication subject (mean = 3.14, SD = 1.06); followed by Item 12: Students have not yet developed sufficient communication skills in the central Malay language communication subject (mean = 3.03, SD = 1.01); and Item 13: Students have not yet developed sufficient career-based communication skills in the Malay language communication subject at a satisfactory level, with a moderate level of problems (mean = 3.00, SD = 0.84).

The students stated the high level of needs of multicultural learning (mean = 3.85, SD = 0.75). The top three needs of multicultural learning were: Item 22: Students need the develop of awareness of cultural diversity in the Malay language communication subject (mean = 4.00, SD = 0.94); followed by Item 19: Students need to be developed their readiness for multicultural learning (Mean = 3.91, SD = 0.85); and Item 20: Students need to develop central Malay language communication skills (Mean = 3.86, SD = 0.94).

Desirable Characteristics of the Multicultural Learning Model Emphasized Career-Based Communication for the Malay for Communication Subject for Grade 11 Students

The researchers conducted a comprehensive review of literature pertaining to Literature-based Learning and Multicultural Learning. Subsequently, the Multi-cultural Literature Learning Model (MCLL) was developed.

The literatures related to multicultural learning or education include: Mitchell and Salsbury (1999), Banks (2001), National Council for Accreditation of Teacher Education (2002, Sungthong (2008), Institute of Research and Development for Health of Southern Thailand (2010), Choochuen (2012), Liewvarin (2009), Najib al-Attas (2002), Wati (1965), Sastera, Kualalumpur and Antara (1965), Dewan (2007), Uden (1994) and Saesong (2009). The key characteristics of Multi-cultural Literature Learning Model (MCLL) can be presented as Table 3.

Key Characteristics of Literature-based Learning	Key Characteristics of Multicultural Learning	Key Characteristics of MCLL
Literature is an art expressed through language, originating from human creativity and imaginative processes.	Education that embraces cultural diversity	**Learning approach utilized language literature from various cultures**
Literature yields diverse values for humanity and facilitates communication among individuals	Aim to foster positive attitudes and values regarding cultural diversity and enhance the ability to learn about different cultures	**Aim to use literature to promote learners' development of communication skills, socialization, cultural learning, and positive values related to cultural diversity**
	Encourages learners to develop the ability to learn and integrate into society with happiness	
Literature can be divided into literary works of art and literary works of expression, both in prose and verse forms.		**Language literatures are classified into literary works of art and literary works of expression, both in prose and verse forms**
The components of literature include rhythm, melody, word arrangement, clear meaning, and fundamental ideas		**The components of language literature include rhythm, melody, word arrangement, clear meaning, and fundamental ideas**

Table 3: Synthesis of key characteristics of Multi-cultural Literature
Learning Model (MCLL)

The Multicultural Literature Learning Model (MCLL) refers to an educational approach that utilizes language literature from diverse cultures. The objective of employing literature is to promote the development of communication skills, socialization, cultural learning, and positive values regarding cultural diversity among learners (Communication, Socialization, Culture Learning). Language literature is categorized into literary works of art and literary works of expression, both in prose and verse forms. The components of language literature include rhythm, melody, word arrangement, clear meaning, and fundamental ideas.

Discussion

In line with the finding from this study, Chomphu Phuengtham (2013) studied the current situation of schools under the jurisdiction of the Ministry of Education in the border provinces of Thailand that share borders with the Union of Myanmar. The finding indicated that the overall educational management situation of these schools falls at a Moderate level in almost every aspect, with the exception of the preservation of local culture, which is rated at a high level. The top three areas are the preservation of local culture, learning conflict resolution through peaceful means, and the continuous creation of educational opportunities.

Regarding cultural diversity research, Nantaburom and Na Ayuthaya (2015) studied the effects of multicultural education-based prejudice reeducation activities on understanding

diversity in races, religions and cultures among upper secondary school students in the ASEAN community. The results were as follows: 1) After the treatment, the attitude scores posttest of understanding of diversity in races, religions and culture in the ASEAN community of students taught by prejudice reduction were higher than pretest scores at 0.05 level of significance. 2) Students changed their attitudes by learning contents which based on the diversity of races, religions and culture in the ASEAN community. Students gained their social skills, thinking skills and learning from others' perspective through prejudice reduction activities which were cooperative activities, critical thinking activities, discussion, drama technique, role playing, simulation, case studies and facing with problems situation activities. This may fulfil the new teaching model created from this study so called the Multicultural Literature Learning Model (MCLL).

Conclusion

This study reveals insights into the current state, problems and needs in implementing multicultural learning of the Malay language communication for grade 11 students in southern region of Thailand. The current state indicates that the content of Malay language communication is suitable for multicultural learning. Implementing multicultural learning can enhance students' proficiency in Malay language communication.

Acknowledgment

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School Leaders Perceptions on STEAM as a Pedagogical Approach in School Education in Nepal

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Abstract

In Nepal, there is a growing enthusiasm for the expansion of STEAM education within the school system, aiming to equip students with the skills necessary to navigate an increasingly challenging world and address complex problems. However, the implementation of STEAM in school education poses significant challenges for educators, teachers, and other stakeholders, requiring a comprehensive understanding of the necessity of integrating STEAM into the curriculum. This study seeks to investigate how school leaders perceive STEAM education and recognize its importance in the educational landscape. Employing a qualitative research design, the study utilizes narrative inquiry to gain insights into the perspectives of school leaders, who hold a pivotal role in the successful integration of STEAM in schools. The research delves into various perceptions of school leaders regarding STEAM as an integrated approach to teaching and learning activities. The findings reveal that there is a lack of sufficient awareness among school leaders about STEAM, emphasizing the need for a deeper understanding of its pedagogical significance. The study highlights the importance of regular engagement with leaders, teachers, and stakeholders to foster an awareness of the necessity of STEAM as a pedagogical approach. Despite recognizing the need for STEAM, school leaders express the allure of continuous support for both leaders and teachers to effectively understand and implement STEAM in Nepalese schools. In light of the study's results, it is recommended that further research be conducted to delve into this subject in more detail. Additionally, there is a call for the continuous expansion of workshops and training programs targeted at school leaders and teachers to enhance their understanding and ensure the sustainable implementation of STEAM in schools throughout Nepal.

Keywords: STEAM Education, Perception of School Leaders, Creativity, Sustainability, Implementing

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Introduction

STEAM (Science, Technology, Engineering, Arts, and Mathematics) is an emerging pedagogical approach to education that empowers teachers in the classroom. There is a growing enthusiasm for STEAM education, recognizing its role in preparing students for an increasingly complex and competitive global environment (Boice et al., 2011). STEAM encourages teachers to utilize project-based, inquiry-based, and hands-on learning activities, fostering an inclusive and integrative learning environment where all students can engage and contribute productively. It serves as an access point for students' inquiry, creativity, critical thinking, and inclusive dialogue while teaching various subjects in an integrated form. STEAM education uses science, technology, engineering, arts, and mathematics as guiding sources for students to engage in dialogues, inquiry, and critical thinking (Riley & Solic, 2017).

Furthermore, STEAM assures students' engagement in creative work through group collaboration, resulting in innovative outcomes. The STEAM curriculum is learner-centric, incorporating instructional pedagogies such as inquiry-based, project-based, art-based, and research-based learning, with teachers serving as facilitators rather than direct problem solvers. Herro et al. (2018) suggest that these learning opportunities foster innovative thinking and creativity in solving authentic problems.

The use of the STEAM approach has become indispensable in school education, emerging as one of the latest and most influential teaching tools for the democratic and meaningful participation of students in the learning process through various activities, projects, and practical experiences. Hammad and Khan (2021) argue that implementing STEAM in school education engages students with cognitive tools and complex reasoning skills, involving them in scientific research, philosophy, and ethics. Integrating STEAM into teaching and learning activities in the classroom helps build 21st-century core skills, preparing students for growth and progress.

However, the current education system often neglects the teaching of problem-solving skills and collaboration. To address this, schools need to transition from traditional rote learning to a holistic interdisciplinary approach like STEAM (Lanthan, 2017). STEAM is considered an interdisciplinary to transdisciplinary approach to teaching and learning (Liao, 2016). Despite its potential, the execution of STEAM in school education remains limited, with school leaders holding different perspectives on how to conceptualize STEAM based on purpose, the nature of discipline integration, and their roles.

The awareness and perception of school leaders regarding STEAM play a significant role in its implementation in the teaching and learning process. The challenges lie in interpreting and enacting STEAM in classrooms, as leaders and teachers may not be sufficiently familiar with STEAM principles. Proactive and committed school leaders are essential to promoting high-quality education using STEAM instruction, given the inherent challenges. This is influenced by teachers' preparedness, attitude, and willingness. School leaders need to focus on motivating all stakeholders for STEAM implementation, and understanding leaders' perceptions of STEAM as pedagogical tools. Therefore, it is essential to investigate how school leaders perceive STEAM as a pedagogical approach and understand their views on its implementation, addressing the what, how, and why of their perspectives.

Problem Statement

The understanding of the STEAM pedagogical approach by school leaders is crucial for its effective implementation in classrooms. The growing demand for STEAM education at the school level emphasizes the need for learners to develop creativity and innovation by comprehending science, technology, and arts. Consequently, the leadership's skills, knowledge, and understanding become pivotal for the successful integration of STEAM into teaching and learning activities. However, the extent to which school leaders are aware of STEAM and their role in supporting teachers for its effective implementation remains uncertain. Through interactions with other school leaders, it has been observed that a significant number are unaware of STEAM. Thus, there is a pressing need to equip school leaders with the necessary knowledge and understanding through professional development strategies to enhance their capacity for STEAM implementation.

Purpose of the Study

The primary aim of this study is to enhance the perception of school leaders regarding STEAM as a pedagogical approach to education. The study seeks to analyze how leaders recognize and define the direction of STEAM education. Specifically, it explores leaders' perceptions of STEAM as a pedagogical approach and aims to provide recommendations for further steps to ensure the effective and meaningful integration of STEAM in school education.

Research Question

i) How do school leaders perceive STEAM Education?

Significance of the Study

This study holds significant importance in extracting the knowledge, understanding, and skills of leaders concerning STEAM as a pedagogical approach. It helps readers comprehend the role of school leaders in creating an environment conducive to STEAM activities. Additionally, the study conducts interviews with school leaders to understand their perceptions of STEAM and how, if at all, they are implementing it. Given that STEAM is a valuable tool for fostering problem-solving, creativity, and innovative skills in students, this research aids school management in integrating the STEAM approach into teaching and learning activities. The study also recommends policy changes in schools to incorporate the STEAM approach. Recognizing that teachers are key players in STEAM implementation, the study also explores the need for a STEAM professional development program for both school leaders and teachers.

Literature Review

In this section, I have reviewed various scholarly articles and journals related to STEAM in education. The literature indicates a global trend of increasing implementation of STEAM in schools worldwide. STEAM, an integrated pedagogical approach, represents a paradigm shift in learning methodologies, fostering innovation, creativity, and practicality in study. It amalgamates Science, Technology, Engineering, Arts, and Mathematics, engaging students actively in addressing real-world problems (de la Garza, 2021). This approach aims to equip

students with the knowledge, attitudes, and skills necessary for problem-solving, designing, and explaining natural phenomena (Harris & Bruin, 2018).

STEAM emerges as a powerful pedagogical approach, emphasizing interactive and activity-based learning, project-based learning, research-based learning, and innovative learning. Notably, STEAM enhances students' capacity to innovate (Taylor, 2016), making it an optimal educational tool. The linchpin for transforming traditional education to the new STEAM approach is the school leader, responsible for reshaping the vision and mission of academic success for all students. The perception of school leaders plays a pivotal role in promoting the high quality of STEAM as a pedagogical approach (Lewis, 2015).

However, my interactions with school leaders reveal a lack of clear understanding regarding STEAM and its transformative impact on students' creativity, critical thinking, and innovation. Many leaders remain unaware of STEAM, even those who have implemented it express limited knowledge. In Nepal, there is a growing interest in STEAM implementation, but leaders need to comprehend its importance in education.

Research indicates a significant gap between leaders' perceptions and actual STEAM practices in education (Byun et al., 2016). Therefore, leaders' professional development is crucial to bridge this gap in Nepal. Most school leaders are unconscious of the need to implement STEAM in education.

Moreover, the collaborative effort of teachers from various disciplines is vital for understanding and implementing STEAM effectively (Jho et al., 2016). Teachers should engage in collaborative work to develop interdisciplinary instruction and communicate effectively. Challenges in implementing STEAM include considering social and emotional perspectives of learning and adapting to ever-changing pedagogy and technology (Luitel et al., 2020).

However, resistance to change persists among some leaders and teachers who prefer traditional teaching methods. Young, self-motivated teachers are eager for change but face challenges such as insufficient time and a lack of educational materials for STEAM implementation (Lee & Shin, 2014).

Therefore, leaders' professional development based on STEAM becomes crucial. Cook and Bush (2018) emphasize the role of school leaders in setting a vision and mission that focuses on the research and integration of the STEAM approach. This shift from system leadership to instructional leadership supports school leaders in recognizing the need for STEAM to enhance student engagement and foster creativity.

Kim (2014) argues that sustainable professional development for leaders should involve designing courses and lesson plans based on content and the integration of the STEAM approach in school education. The government of Nepal, through its National Education Policy 2076, aims to integrate STEAM education into the curriculum at all levels (NEP, 2076). However, challenges related to infrastructure, the readiness of leaders, and the realization of this commitment remain to be addressed.

Theoretical Review

In the exploration of issues related to leaders' perceptions and attitudes toward the STEAM approach and its implementation in schools, two distinct theoretical perspectives were employed in this research study. To elucidate these issues effectively, the study drew upon the Person Perception Theory, focusing on the cognitive processes involved in forming impressions of others and deriving conclusions from these impressions (Bargh et al., 1996). Within the realm of social psychology, Person Perception Theory addresses the social processing issues that influence how individuals perceive, interpret, and extract attitudes and behaviors from others (Cunningham, 2019). This perspective is particularly valuable for understanding the personal attributes of school leaders and teachers and their role in the transformative process within education. The aim is to uncover the personal attributes relevant to the issues at hand and to examine how leaders perceive STEAM as an interdisciplinary approach.

Person perception is a subjective process influenced by various variables, including the observation of people, the context of the situation, personal traits, and experiences. It facilitates a critical analysis of leaders' thoughts and perceptions regarding the identified issues.

On the other hand, social constructivism emerges as another significant theoretical perspective for instruction and practice, grounded in social experiences. School leaders engage in diverse interactions and participate in workshops and training sessions regularly. These interactions, visits, and participations contribute significantly to shaping perceptions of STEAM as a pedagogical approach. Social constructivism emphasizes the fundamental role of social interactions in the cognitive development of learners (Vygotsky & Cole, 1978). Regular participation in workshops, interactions, and collaborations is crucial for the complete integration of STEAM in schools. This study aims to construct knowledge, understanding, and skills among school leaders regarding STEAM, ultimately facilitating the implementation of the STEAM approach in school education.

For the successful integration of various disciplines under the STEAM approach, consistent interactions with teachers from different disciplines and other stakeholders are essential. This interaction allows for the implementation of STEAM in schools by garnering ideas and perceptions from observations, interactions, and collaborations. The constructivism theory underlines the significance of authentic learning experiences reflective of students' environments, involving the acquisition of understanding through interaction and collaboration with others, such as teachers, leaders, and experts (Wilson, 1996). This dialectic perspective aids in interpreting personal perceptions on the raised or forthcoming issues through the qualitative research design.

Methodology

Research Approach

In this investigation, I employed interpretivism paradigms to elucidate leaders' perspectives on STEAM education. The focus was on uncovering leaders' perceptions regarding the implementation of STEAM as a pedagogical approach, exploring their experiences, beliefs, and how these factors influence the incorporation of STEAM in schools. To address the research question, a qualitative approach was chosen. Intensive, focused, and purposeful

interviews and interactions were conducted with four school leaders to gather qualitative data. The use of narrative in this study facilitated the extraction of personal perceptions from respondents based on their experiences and beliefs.

The qualitative approach was selected to enable an in-depth exploration of leaders' perceptions regarding STEAM and its integration into teaching activities at schools. This method facilitated a comprehensive understanding of school leaders' perspectives on using STEAM in educational settings.

From the total schools in Budhanilkantha Municipality, four school leaders were selected for in-depth inquiry, comprising two from public schools (one male and one female) and two from private schools (both males). To ensure varied information related to the issue at hand, one public and one private school where STEAM or STEAM-related activities were already underway were chosen. Additionally, one public and one private school were selected where such practices were not being implemented. Purpose sampling was adopted to capture diverse perspectives on the implementation of STEAM in schools.

Method of Data Collection

To gather comprehensive information, semi-structured open-ended interview questions were prepared. The interviews took place separately in the respective offices of the school leaders in physical mode. Open-ended questions provided participants with flexibility in responding, aligning with Creswell's (2012) recommendation. In-depth interviews and focus groups were considered ideal methods for collecting data, aiming to extract individual experiences and perceptions of STEAM in education as a pedagogical approach.

A detailed interview guideline and formulated questionnaires were utilized, with verbal consent obtained through mobile phone calls before conducting the interviews. The interviews were conducted on different days, with a single-day session for public school leaders and a subsequent day for private school leaders. Responses were recorded using a mobile device, and brief notes were taken during the interviews. Prompts were employed to encourage participants to expand on their responses. The recorded information was transcribed for further analysis. The qualitative data were gathered through in-depth interviews and conversations, focusing on participants' academic background, professions, core subject areas, and willingness to progress in understanding their perceptions of STEAM practices in schools.

In a qualitative study, ethical considerations are of particular importance due to the in-depth nature of the study process (Arifin, 2018). To uphold ethical values, measures were taken, including safeguarding the identity of schools and leaders, obtaining verbal consent via phone calls before interviews, informing respondents about the issues, and securing consent for audio recording. Interviews were conducted in the leaders' offices at their respective schools on different dates and times, with respondents participating voluntarily. To protect personal identity, school leaders were coded as respondents A, B, C, and D.

Participants

A purposeful selection of four school leaders within Budhanilkantha Municipality was undertaken to gather perceptual data for the study. The participants comprised two school leaders from different public schools and two from private schools. Among the four schools,

one public and one private institution had initiated the concept of STEAM. The demographic details of the participants are outlined as follows:

Participants	Sex	Age (in years)	Type of School	Academic Background	Work Experiences as Leader	STEAM Experiences
A	Female	52 years	Public	Science Background at first, M. Ed. in Nepali T. U.	27 years	Intermediate
B	Male	48 years	Public	B. Sc., M. Ed., EPM from KU	13 years	Heard term STEAM with little knowledge
C	Male	49 years	Private	Master in Economics	17 years	Intermediate
D	Male	47	Private	Master in English and M. Phil in English from PU	15 years	Heard term STEAM with little knowledge

Results and Discussions

This study aimed to investigate the perspectives of school leaders on the implementation of STEAM (Science, Technology, Engineering, Arts, and Mathematics) in education using a qualitative research approach. The study employed a purposive sampling method in the context of Budhanilkantha Municipality, involving respondents from both public and private schools. The findings, derived from four in-depth interviews and the researcher's observations, are presented in three overarching themes.

STEAM in Education: An Integrated Approach

This study aimed to perceive and recognize people's experiences and knowledge regarding the practice of STEAM in education. The information obtained from selected respondents explored the role of academic background, experiences, and participation in this context. Respondent A reported that, due to a science background, her academic starting enabled her to view STEAM in school as an integrated approach to learning. She emphasized the importance of long experiences and various pedagogical exposures, which supported her in employing effective teaching and learning approaches.

Respondent A further highlighted that STEAM, as an innovative and creative pedagogical approach, amalgamates Science, Technology, Engineering, and Mathematics. Involving students in STEAM enhances learning tendencies and outcomes, fostering problem-solving skills. Active, dynamic, and well-trained leaders, according to respondent A, play a significant role in understanding and implementing STEAM in school education. STEAM, as an integrated pedagogical approach, enhances students' understanding across multiple

disciplines, contributing to improved problem-solving skills, application of science concepts, and advancements in technology and engineering (Psycharis, 2018).

Arts and Mathematics in STEAM are deemed essential, with arts playing a pivotal role in fostering creativity, expression, emotions, feelings, and imagination. The aesthetic value of arts in STEAM contributes to students becoming more creative and critical thinkers (Tan et al., 2021). Respondent B, a science background professional with an M. Phil in Education Leadership, expressed that STEAM is crucial for fostering creativity, critical thinking, innovation, and problem-solving skills. He provided an example illustrating the fusion of Science, Technology, Engineering, Arts, and Mathematics in a comprehensive learning approach.

According to Respondent B, STEAM is an integrated method that necessitates a shift in teaching methods within the classroom. He emphasized the importance of teacher preparedness and willingness, which is achievable with energetic, dynamic, and change-making leaders in schools. Respondent B asserted that STEAM is the best pedagogical method for teaching and learning in schools in the 21st century, indicating a paradigm shift in educational practices (Tan et al., 2021).

Respondent C, a leader in a private school with a management background, enthusiastically participated in the interview. Despite not having a detailed understanding of STEAM, the respondent acknowledged its significance through collaboration with a social enterprise. The involvement in activities of this organization helped the respondent recognize STEAM as a robust and influential integrated pedagogical approach in teaching and learning in schools.

The curriculum is essential for teaching specific disciplines in schools, but the integration of different disciplines for lifelong learning poses challenges. The Nepalese government has introduced an integrated curriculum in primary education, aligning with the STEAM model (Yakman, 2010). Respondent C emphasized the importance of STEAM in meeting the goals of 21st-century education, focusing on creativity, critical thinking, collaboration, communication, imagination, global citizenship, problem-solving, and digital literacy.

21st-century education aims to enhance survival skills through soft skills and technological skills, demanding their integration into schools. However, this integration creates challenges in pedagogy and assessment, with curriculum, professional development, and assessment being intertwined factors (Soland et al., 2013; Erdem, 2020). Aligning STEAM in the curriculum is deemed essential for a better life in the world, fostering new entrepreneurship, sociability, and adaptability.

Respondent D, with an academic background in mathematics and literature, has served as a school leader in various institutions. As a member of the PABSON committee, Respondent D participated in discussions, training, and workshops, gaining insights into the use of STEAM in education as an integrated approach. Although not extensively aware of its implementation, Respondent D recognized STEAM as an integrated curriculum emphasizing science, technology, engineering, arts, and mathematics through multidisciplinary and interdisciplinary approaches.

STEAM education has gained popularity, emphasizing interdisciplinary and transdisciplinary learning approaches (Liliawati et al., 2018). Respondents in this study, through interviews, expressed STEAM as an integrated approach to teaching and learning, essential for 21st-

century education. STEAM incorporates innovative, creative, collaborative, and communicative skills, addressing real-world problem-solving.

Moreover, Richard & Biffle (2016) argue that STEAM is a multidisciplinary to transdisciplinary approach, focusing on problem-based inquiry, research, lifelong holistic learning, and enhancing problem-solving, critical thinking, and tactile skills (Maeda, 2014). Respondents highlighted that STEAM develops self-reflection, communication, collaboration, creativity, and innovation in students, facilitating holistic and innovative learning (Naithram, 2014). Although respondents acknowledged the importance of STEAM in school-level education, they expressed a lack of a clear concept on its implementation in existing classroom settings.

Implementation of the STEAM Approach Poses Challenges

This study aims to explore how school leaders perceive and act upon the practices of STEAM education within their schools, focusing on the integration of STEAM into classroom teaching and learning activities. Interview questions under this theme seek to identify the efforts STEAM leaders undertake to embed STEAM across various content areas in the school. Respondent A asserts that integrating STEAM into the teaching and learning process enhances liveliness, effectiveness, and creativity. The respondent emphasizes the successful initiation of the STEAM approach after training 40 teachers, leading to enthusiastic teacher adoption and effective teamwork. The gradual growth in this approach is illustrated through examples of traditional object displays, incorporating indigenous knowledge to enhance STEAM practices in the school.

The implementation of the STEAM approach at the school level is acknowledged as challenging but crucial, with the leader's role being pivotal in ensuring success. Proactive, dynamic, and committed leaders play a significant role in embedding STEAM in teaching and learning activities at the school level. Collaboration among teachers from different disciplines is deemed essential for developing STEAM-based curricula and lesson plans (Hammad & Khan, 2021). The integration of traditional and indigenous tools, techniques, arts, and artifacts further aids in aligning STEAM subjects with traditional ones.

Respondent B provides a different perspective, highlighting the difficulties faced in implementing STEAM practices in a government school setting. Resistance to change among teachers, coupled with concerns about job security, poses obstacles to the successful integration of the STEAM approach. Effective collaboration between leaders and teachers is deemed crucial for overcoming these challenges and ensuring the successful implementation of STEAM in school-level education.

Respondent C, a leader in a private school, emphasizes the inevitability of incorporating STEAM practices in teaching and learning processes. Despite challenges in perfect implementation across all grades and subjects, the leader underscores the role of leaders' perception in driving effective STEAM practices. Professional development, collaboration among teachers, and effective communication of concepts are identified as key factors supporting STEAM in the school curriculum (Hammad & Khan, 2021).

Respondent D expresses reservations about the feasibility of integrating STEAM during regular class hours, citing teachers' and parents' time constraints. However, acknowledging

the importance of incorporating new approaches in the curriculum, the respondent highlights the challenges associated with teachers' preparedness, attitudes, and interests.

The common theme among respondents is the unanimous recognition of the essential nature of STEAM in school education, despite facing challenges. Barriers include teachers' preparedness, willingness, and proactiveness, as well as national curriculum constraints, time limitations, and a marks-oriented mindset among guardians. Challenges in STEAM implementation reported by teachers include collaboration difficulties, increased workload, and a lack of understanding of STEAM integration (Harro et al., 2018).

Sustainability of the STEAM Approach in Schools Requires Regular Professional Development Programs

In Nepal, a paradigm shift in pedagogical approaches from traditional 'chalk and talk' to innovative, effective, and creative methods is imperative. STEAM, an integrated learning approach, amalgamates various disciplines to address and solve real-life problems. Given the multitude of challenges at the community, national, and international levels, as well as environmental concerns crucial for survival, integrating STEAM into teaching and learning becomes essential. This approach connects knowledge and skills with real-life situations and environments, fostering the development of better individuals for the future.

However, ensuring the sustainability of implementing STEAM in teaching and learning activities faces challenges. Respondent A emphasized the necessity of regular discussions, interactions, and participation in training and workshops for the effective and sustainable implementation of STEAM. Despite acknowledging STEAM's significance, challenges such as budget constraints, limited space, and primarily teachers' attitudes and behavior hinder the integration of STEAM in school education.

Respondent A highlighted that participation in various workshops and STEAM training sessions positively influenced her and motivated her to promote STEAM in her school. Despite the growing interest in STEAM education in Nepal, its sustainable implementation is hindered by factors such as teacher and leader awareness, training on STEAM pedagogy, teachers' attitudes, willingness, and budget constraints. Workshops and training sessions have proven to increase teachers' interest in implementing STEAM in their classrooms and enhance their enjoyment of teaching STEAM lessons (Boice et al., 2021). Continuous and robust support for teachers plays a crucial role in the sustainable implementation of STEAM.

In terms of sustainability, respondent B outlined plans to incorporate STEAM in their system, including STEAM-based training for teachers in the current academic session with the collaboration of Kathmandu University and other organizations. Kathmandu University School of Education (KUSOED) has introduced programs focusing on STEAM education, offering training and workshops for schoolteachers and leaders.

Respondent C demonstrated a proactive stance, emphasizing the importance of nurturing students' innovative attributes through engaging activities for a safer and wiser world. Commitment from school leaders and regular support to teachers is crucial for the perfect implementation of STEAM in schools. Leader awareness and proactiveness are essential for conducting training and workshops, enhancing teacher efficacy, and ensuring sustainable STEAM use.

In comparison, respondent D highlighted the importance of ongoing support through training, workshops, and interactions for effective STEAM implementation. The attributes of teachers can impact STEAM implementation negatively, necessitating leaders' roles in motivating teachers to understand and implement STEAM in teaching and learning activities. Implementing STEAM in the classroom presents challenges, requiring collaboration, increased workload, and an understanding of STEAM integration. Therefore, teachers should be continuously trained and encouraged for STEAM implementation through practical and interactive workshops.

Respondents collectively agreed that the perception of school leaders on STEAM is often insufficient, and regular support for both leaders and teachers is essential for effective STEAM implementation at the school level. Professional development programs for leaders and teachers increase confidence in planning and implementing STEAM, fostering interest, motivation, creativity, and collaborative abilities. Respondents emphasized the need for advanced professional development training and workshops that are practical, interactive, and hands-on, ensuring that educators can directly apply what they learn in the classroom.

Findings and Conclusion

In the context of Nepal, STEAM emerges as a novel integrated pedagogical approach in school-level education, garnering significant attention in educational forums and institutions. Kathmandu University School of Education (KUSoEd) has taken proactive steps by introducing Master and M. Phil courses in STEAM education. These programs aim to produce well-qualified and trained schoolteachers and leaders, enabling them to effectively implement STEAM in school-level education.

The qualitative narrative inquiry and discussions conducted for this study revealed key insights. The primary conclusion is that school leaders exhibit varying degrees of awareness about STEAM. Approximately half of the participants have initiated the implementation of STEAM in their schools to some extent, although they express uncertainty about the precise methods. The remaining respondents are aware of STEAM but have not yet initiated its implementation. All participants unanimously acknowledge the importance of STEAM in education, citing its positive impact on students' creativity, critical thinking, and engagement. However, the study underscores that the leadership's role is crucial, as school leaders directly guide teachers in integrating STEAM into their teaching practices.

Sanchez et al. (2020) highlight the unique role of school leaders in guiding and supporting the professional development of teachers. Consequently, the perception of school leaders regarding the practices of STEAM in school education plays a pivotal role. Effective implementation becomes more feasible when leaders possess a well-crafted understanding of STEAM and are committed to its application in schools. Respondents emphasize the need for sequential and continuous professional development training and workshops for teachers to successfully adopt the STEAM approach in teaching-learning activities.

The study participants, primarily from public schools, note the challenges posed by teachers' resistance to change and their hesitation to embrace a new system or approach, particularly when transitioning from traditional methods. Teachers' efficacy, interest, and attitudes emerge as consistent factors hindering the perception and implementation of STEAM in schools.

Collaboration among teachers of different subjects is identified as a key strategy for enhancing understanding and support for STEAM. The essence of STEAM education lies in applying knowledge to real-life situations and fostering problem-solving skills through innovation, creativity, critical thinking, and collaboration.

In the context of Nepal, the study finds that only a limited number of school leaders have a well-formed perception of STEAM and are committed to its practice. However, a majority of school leaders remain unaware of STEAM. Consequently, the study advocates for the widespread adoption of the STEAM approach across all schools. Achieving this goal requires comprehensive training, workshops, and continuous support for schoolteachers and leaders, enabling them to fully embrace and understand STEAM for the benefit of present and future generations.

Recommendation

Based on the results and discussions presented, several recommendations emerge for the effective implementation of STEAM (Science, Technology, Engineering, Arts, and Mathematics) education in schools. These recommendations aim to foster a conducive environment for nurturing students' creativity and problem-solving skills:

Commitment of School Leaders: The transformation from traditional schools to STEAM-based institutions requires a steadfast commitment from school leaders. To enhance students' creativity and problem-solving skills, school leaders should actively embrace and drive the necessary changes.

Professional Development for Teachers: School leaders play a pivotal role in facilitating the integration of STEAM into the curriculum. They should prioritize engaging teachers in professional development programs that focus on the integrated approach of teaching and learning within the STEAM framework. This ensures that educators are well-equipped to deliver STEAM-based education effectively.

Self-Motivation and Collaboration: Both school leaders and teachers must exhibit self-motivation and commitment to the practice of STEAM in schools. It is imperative that they approach this educational shift with positivity, willingness, and a keen interest in fostering discussions and collaborations. This collaborative spirit is essential for the seamless and effective implementation of STEAM education.

Further Research: To deepen our understanding of the perceptions of leaders and teachers regarding STEAM education, additional studies should be conducted. These studies could delve into the specific attitudes, challenges, and opportunities that educators encounter when transitioning to STEAM-based teaching methodologies.

Leadership in STEAM Integration: School leaders are encouraged to take on the role of STEAM leaders. By assuming this leadership position, they can actively equip, encourage, and motivate teachers to embrace the pedagogical changes associated with transitioning from traditional teaching methods to the more integrated and holistic approach of STEAM education. This leadership is crucial in fostering a positive and supportive environment for both educators and students.

Appendix

Questionnaires
Perceptions of School Leaders' on the Practices of STEAM as Pedagogical Approach in School Education

Questionnaire for quantitative information
Respondent's Information
Name of respondent: …………………………………………………………………....
Age.: ……………………..Sex: Male ☐   Female ☐
Subjective Background: …………………
Qualification………………………………
Experience: ……………… years   Pedagogy used in classroom: …………….
Training and workshop taken:………………. Times   Type: ……………………….
Name of school and address:
Types of school: Private ☐   Public ☐

Questionnaires for interview

1. Would you introduce yourself and little about family background?
2. How do you describe your experiences in school as leader, including elementary school, middle school, and high school?
3. How familiar are you with teaching pedagogy practiced in school?
4. Have been you involved in training or workshop related to pedagogical approaches in school? Please share your experiences
5. Describe your Understanding of STEAM in Education as a pedagogy?
6. What do you believe that STEAM is appropriate teaching learning pedagogy in this era? Elaborate based on your experiences.
7. What would you like others to know about how schools can better educate students through STEAM approach in learning process inside the classroom?
8. How often your teachers use STEAM approach in classroom teaching – learning activities?
9. Are you satisfied whatever teachers are using STEAM in teaching learning activities? If yes or no, present your argument over the statement.
10. What reformative efforts are required for effective implementation of STEAM in school?

Note: Some probing questions were asked for the extraction of further perception of respondents on STEAM as pedagogical approach i

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Exploring Classroom Interactions to Facilitate the Tacit Knowledge Construction of International Baccalaureate Secondary School Students in Hong Kong

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Abstract

In an interconnected and global society that is rapidly changing, it becomes imperative to equip students with the required tacit life skills to meet the challenges of the modern world. The International Baccalaureate (IB) is a highly regarded educational system providing a holistic and interdisciplinary approach that nurtures its students as global citizens with a broad cultural perspective. This study investigates the acquisition of tacit skills and the construction of tacit knowledge of secondary school IB students in Hong Kong. The focus is on the role of social interactions in the classroom that facilitates its construction. A mixed-method approach was designed for data collection and analysis. The study's outcomes contribute towards developing a framework and suggest teaching strategies for effective tacit knowledge construction. The paper discusses the findings of a pilot study conducted in an IB school in Hong Kong.

Keywords: Tacit Knowledge Construction, IB Classroom Interactions, Social Interactive Spaces

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Introduction

The International Baccalaureate (IB) educational program is becoming increasingly widespread as setting high standards for education. With its global vision and rigorous approach, it provides a qualification that universities around the world recognise. The IB seeks to foster its students with the knowledge and adaptability to succeed in a global society that is beyond the scope of traditional academic learning. Not only do IB students learn to think about global issues through multiple perspectives critically, but they also learn to appreciate other cultural perspectives.

The IB education system is popular in higher education because it focuses on teaching essential life skills like critical thinking, creativity, and problem-solving. However, in addition to these tacit skills, success in the modern world requires cultivating other soft skills like communication, collaboration, and compassion, all of which are emphasised. Furthermore, this holistic teaching approach equips students for lifelong learning and public engagement, making them well-rounded individuals. Thus, the IB method emphasises a student's academic success and development as a person, socially and emotionally.

Tacit knowledge is considered troublesome (Perkins, 2006) and difficult to teach and acquire. It is because "teachers' more seasoned presumptions can operate like conceptual submarines that learners can never manage to detect or track" (Perkins, 2006, p. 40). It can be demonstrated, but the onus is on the learner to grasp the meaning of the demonstration (Polanyi, 1966). Therefore, such knowledge is constructed by the learner through a self-reflective and interactive process. Though considered to be constructed mainly through hands-on learning, studies by Venkatesh (2021) in design education have revealed the multidimensional aspect of tacit knowledge construction. This study expands the research of Venkatesh's study on design students at the University to study the tacit knowledge construction of secondary school IB students in Hong Kong, an area with limited explorations.

What is the IB About, and When Did It All Start?

The IB was established in 1968 as a non-profit educational foundation in Geneva, Switzerland. Intending to address the issue of "curricula internalisation" for globally mobile students, the educators sought a "universal pedagogy" that would allow students to qualify in any university around the world (Hill & Saxton, 2014, p. 43). Its neoliberal approach and emphasis on international-mindedness appealed to countries like the US, where it spread rapidly. Subsequently, many other countries started to adopt the IB curriculum, expanding the IB community from private international schools for internationally mobile students to state and public schools (Hill & Saxton, 2014). More than 7,800 programs were being offered in 159 countries by the beginning of April 2023, spread among more than 5,600 schools. A growth of 34.2% in IB programmes was recorded from 2018 to 2022. 46.6% of the total number of programmes were taught in The Americas, 30.5% in Asia-Pacific and 23% in Africa, Europe and Middle-east (IBO, 2022a).

Four excellent international education programmes are implemented by schools with support from the IB. The Primary Years Programme (PYP) for ages 3 -12, Middle Years Programme (MYP) for ages 11 – 16, Diploma Programme (DP) for ages 16 – 19 and the IB Career-related Programme (CP) for ages 16 – 19. Centered around the learner, the IB learner profile

aims to nurture ten learner attributes using effective teaching and learning approaches through a "broad, balanced, conceptual and connected curriculum" (IBO, 2017, p. 1).

All IB programmes are grounded on the constructivist approach of teaching and learning, asserting that knowledge and meanings are actively constructed by the learner based on prior experiences and social interactions that constantly change with new situations (Mertens 2010; Lincoln et al., 2011). IB programmes are intended to foster intellectual curiosity in young people and provide them with the knowledge, conceptual understanding, skills, reflective practices, and attitudes" necessary to become independent lifelong learners (Hill & Saxton, 2014, p. 45). To aid constructivist learning, IB teachers use pedagogical approaches like project- and conceptual-based learning. IB programme students are "encouraged to explore and construct their own personal and cultural identities" (IBO, 2022b).

The IB in Hong Kong

The IB World School has been around in Hong Kong since 1988. As of 2023, 70 schools offer one or more IB programmes. Forty-one schools offer PYP, 16 offer MYP, 37 offer the DP programme, and seven offer Career-related programmes (IBO, 2022c). Sixty of these schools are private schools, and ten are state-owned. Seven schools that offer IB in Hong Kong are under the English Schools Foundation (ESF), Hong Kong's largest international educational organisation in teaching in the English medium. Nine schools that offer the DP programme come under Hong Kong's Direct Subsidy Scheme (DSS), which "provides a "middle way" in the education market between international schools and the national curriculum at local schools "(Lee et al., 2022).

A deregulatory policy in Hong Kong allows the DSS schools to run a flexible curriculum incorporating the IB programme. According to Lee et al. (2022), the IB as an international education of choice is driven by three factors – the policymakers' view that it is a progressive alternative to the local education system, its position as a global trend and its portrayal by the media as a "distinctively well-rounded education". The marketing may have prompted many affluent local families in Hong Kong to opt for IB international schools (p. 136).

Benefits and Challenges in the IB Educational System

Dickson et al. (2020) assess the benefits and challenges of the MYP programme in Australia by examining teacher and school leader perceptions of the MYP's effectiveness in fostering student learning. Results revealed that the inquiry-based approach made students better problem-solvers of global issues through an interdisciplinary approach that made students connect to real-world experiences. In addition, the participants reported the development of learning skills such as time management, independence, ownership, research, reflection, and resilience. Besides, the programme provides a "transferrable education" for mobile students to adjust to a familiar learning methodology as they move schools between different countries (p. 192). Finally, the researchers add that the well-structured assessment criteria allow MYP students to achieve higher learning results.

In contrast, in a study conducted on DP alums from Hong Kong, there was a perception that mainstream schooled students were more accustomed to a teacher-centric approach, memorisation, with no peer interactions, the acquisition of specialised knowledge and assessment-based examinations (Wright & Lee, 2022). The preparation for IB students' adaptation to the academic life of Hong Kong universities are therefore questionable (p. 703).

Among the challenges faced by the IB system, the main ones are the high expectations it entails from teachers and students. The IB requires higher teaching expertise and learning a new curriculum (Doherty & Shield, 2012). The problem is exacerbated when a school offers a dual curriculum. In this case, the high cost of running the IB programme causes a strain on teachers' time in running bifurcated classrooms, adopting different assessment modes, and strain on the school's resources (Doherty & Shield, 2012). Lower-ability Inquiry-based learning can demoralize non-academic students, making them feel alienated from the programme. (Dickson et al., 2020, p. 197).

What Is Tacit Knowledge Construction?

In the view of Nonaka and Takeuchi (1995, pp. 23-24):

Tacit knowledge is highly personal and difficult to formalise, communicate, or share with others. Subjective insights, intuitions and hunches fall into this category of knowledge. Furthermore, tacit knowledge is deeply rooted in action, an individual's commitment to a specific context, and the ideals, values, or emotions they embrace.

As tacit knowledge is subjective and individualist, constructivist theories resonate with tacit teaching. Burbules (2008) promotes tacit teaching that is neither standardised nor geared toward explicit learning outcomes (p. 669). Instead, it facilitates inquiry-based learning by enabling learners' inferences, connections, and comprehension. A constructivist approach is effective for teaching students to solve complex and ill-structured problems (Ertmer & Newby, 2013, p. 60). According to Andjomshoaa et al. (2011), emphasising knowledge as a constructivist process leads to significant learning outcomes and knowledge retention. The retained knowledge generates tacit knowledge over time.

Constructivism suggests the active participation of learners in knowledge construction. Learners draw from prior experiences and go through an experiential cycle of making and reflecting. Engagement in generative activities results in the creation of new knowledge (Collis & Moonen, 2005). Meanings are shaped and re-shaped through social interactions and discourses. Activities such as brainstorming, concept development or problem-solving are creative pursuits that are tacit knowledge domains. Hence, tacit knowledge construction is "a generative process where an individual is actively engaged to create new and tacit outcomes" (Venkatesh & Ma, 2021a, p. 43). The new knowledge is explicated either visually or verbally. Figure 1 illustrates the components of tacit knowledge construction.
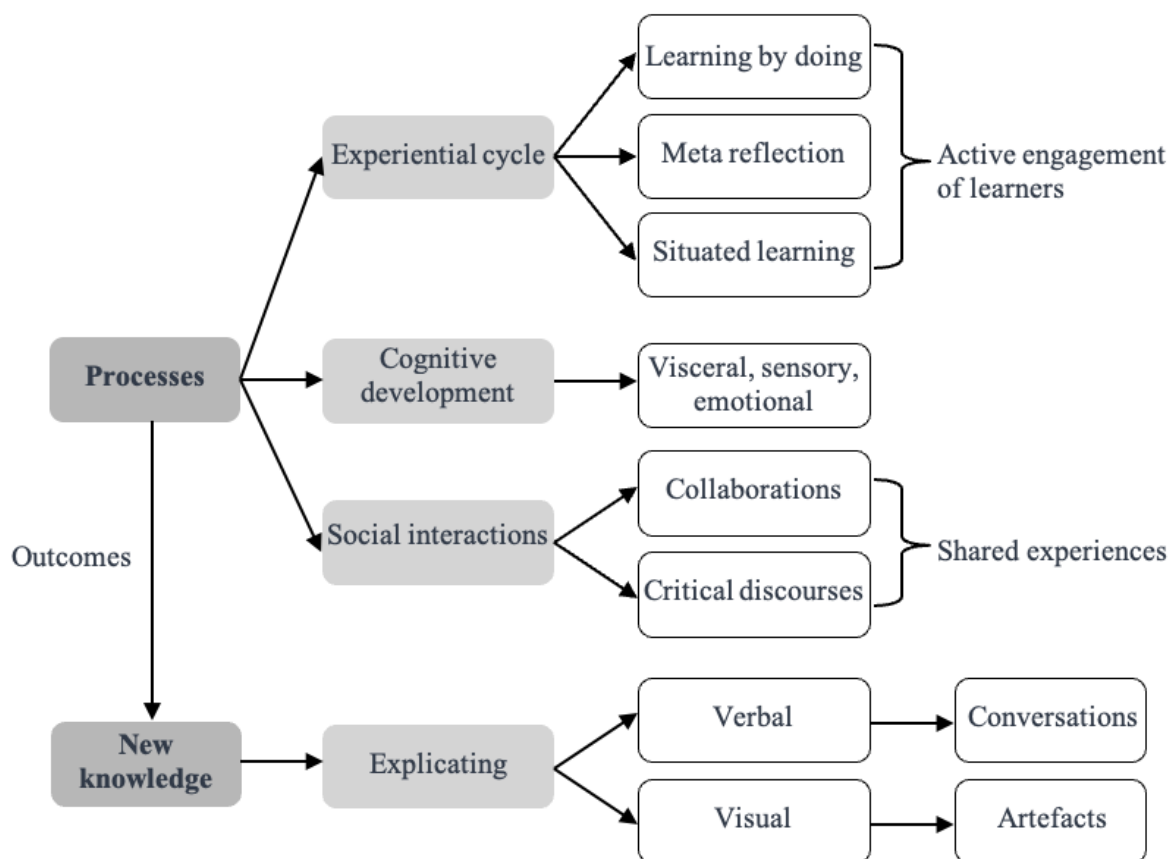
Figure 1: Components of Tacit Knowledge Construction,
adapted from Venkatesh & Ma (2021a, p. 44)

Social Interactions in the Education Environment and Tacit Knowledge Construction

Constructivism is a combination of a cognitive dimension and a socio-cultural dimension. Cognitive theorists like Jean Piaget emphasise that Constructivism is an internal process in which one constructs mental models that are unique to themselves (Von Glaserfeld, 2005). Notable socio-cultural perspectives of Constructivism, such as Vygotsky's Zone of Proximal Development and Bruner's Scaffolding theory, emphasise the influence of social interactions on learning. Lave and Wenger (1991) argue that knowledge is socially co-constructed and situated in a particular context and environment.

Personal experiences embody tacit knowledge. Continuous environmental change creates new mental models and learning (Koskinen et al., 2003). However, Loenhoff (2015) claims that the body can only communicate tacit knowledge through its relationships with other agents. Thus, tacit knowledge is collective, context-dependent, embodied in "social habituations" and includes "cultural capital" (Loenhoff, 2015; Mareis, 2012, p. 70).

According to Nonaka and Takeuchi (1991), knowledge conversion between the tacit and explicit is a social process (pp. 109-110). Social interactions in the classroom can occur between the teacher and student, between students, inside and outside the classrooms, in physical and virtual settings. Collaborative learning and peer learning are the many ways of interaction that facilitate tacit knowledge construction. Additionally, the cultural atmosphere of the educational setting has the potential to provide a wide variety of different sources of

learning experiences for the students, impacting the students' cycle of experiential learning (van Boeijen, et al., 2017).

Venkatesh and Ma's studies (2021b) on conversations in the design studio reveal the link between critical conversations and tacit knowledge construction. They identify the components of critical conversations as socialisation, cognition and articulation. When multiple perspectives are critically analysed and assessed in the backdrop of social and collaborative environments, the result is the generation of new tacit sensibilities, values, and meanings (p. 7). Knowledge is also co-constructed through design artefacts in the social environment that are mediators, provokers or articulators of critical conversations (Figure 2).
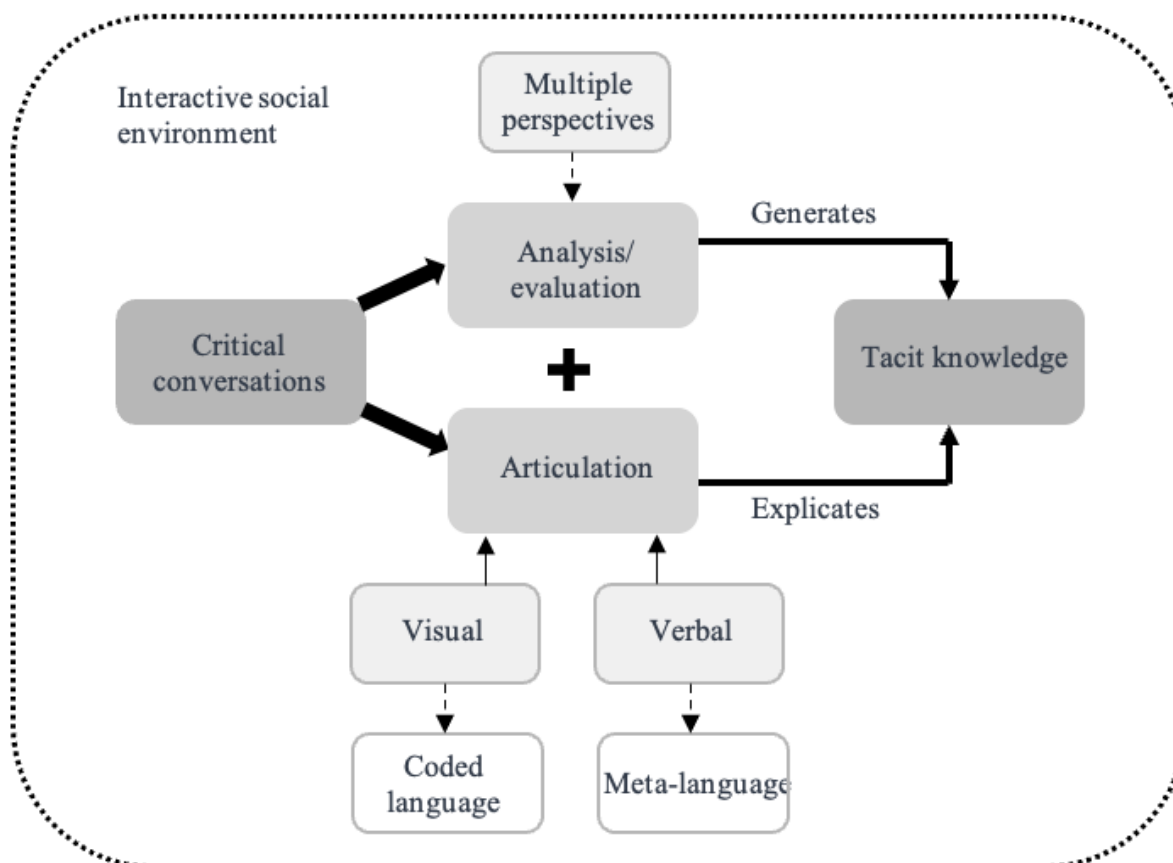
Figure 2: Critical Conversations Lead to Tacit Knowledge Construction,
adapted from Venkatesh & Ma (2021b, p. 7)

Social interactions are increasingly taking place in online and virtual settings, as evidenced by the COVID pandemic. Supported by multi-media and virtual and augmented realities, online interactions expand the sharing of experiences, knowledge, values and beliefs (Oztok, 2013). The synchronous and asynchronous settings afforded by these environments act as a store for knowledge resources and provide opportunities for prolonged and flipped learning beyond the classroom. Besides, the current explosion of Artificial Intelligence chatbots such as the ChatGPT is redefining the sociocultural environment of educational settings. These are potential areas for educational research.

What is Missing?

Despite the many studies conducted on the IB programme, little is known about the tacit knowledge construction processes IB students engage in. Experience and hands-on learning are common sources of tacit knowledge. Developing tacit knowledge is aided by the IB's emphasis on inquiry-based learning and the cultivation of students' abilities to reflect on and articulate their own learning processes. On the other hand, studies have shown that social interactions externally influence tacit knowledge construction in the learning environment. Therefore, improving the efficacy of the IB curriculum and enriching students' learning experiences requires a deeper understanding of how IB students construct tacit knowledge.

Further studies are needed to learn how IB students get the tacit skills necessary to compete in the modern, rapidly changing global economy. In particular, there is a shortage of empirical studies on the role of social interactions in the IB classroom in constructing secondary school students' tacit knowledge. Therefore, this study attempts to address the knowledge gap by trying to answer the following research questions:

1. How does the interactive environment of the International Baccalaureate (IB) classroom facilitate the construction of tacit knowledge among secondary school students?
2. What are the perceptions of secondary school IB students about the role of the interactive environment of the classroom for the construction of their tacit knowledge?
3. What challenges do IB teachers face to facilitate an interactive environment for effectively constructing secondary school students' tacit knowledge?
4. How do IB teachers help secondary school students leverage their tacit knowledge?

The study aims to develop an understanding of teaching and learning practices for effective tacit knowledge construction.

Objectives of the research are:
- To identify and investigate the kind of interactive spaces in the IB classroom that facilitate IB students' tacit knowledge construction
- To understand the issues faced by IB teachers in creating interactive learning environments for tacit knowledge construction
- To examine IB teachers' strategies and techniques to help their students leverage their tacit knowledge
- To share the insights of the study with the IB teachers to help them develop effective strategies for students' tacit knowledge construction

Research Design

Participants of the study are chosen through a purposive sampling of secondary school students and their respective teachers in the MYP and DP programmes of two or three IB schools in Hong Kong. The study uses a mixed-method approach using quantitative and qualitative data collection methods conducted in two phases. Phase one is a pilot study that observes the interactions between teachers and students in secondary school classrooms of one IB school. This paper discusses the data collection, analyses and findings of the pilot study.

Phase two will involve conducting observations and semi-structured interviews with participants from other IB schools. Additionally, a subset of students will participate in a

focus group to encourage sharing experiences and knowledge, thereby capturing qualitative data through questioning and critical discussions.

A professional protocol with the participants was maintained throughout the research. Participants were communicated to seek their consent before the study. The researchers followed the ethical standards established by the University for conducting research involving human participants. Consent forms along with an information sheet were sent to all participants or their parents in case of minor-aged participants. Their identities remain anonymous. They were notified that they were free to leave the study at any point. All data was kept in the safe possession of the researchers.

Significance and Possible Outcomes of the Study

This study is anticipated to provide insights into the classroom interactions that support the construction of tacit knowledge among students attending IB secondary schools in Hong Kong, thus addressing the knowledge gap in this area. The study outcomes will be shared with all the participants and the wider educational community through reports and journal articles. It will bring critical awareness to educators and students of existing teaching and learning practices in the IB system.

Different interactive spaces that will be identified will be developed into a conceptual framework for tacit knowledge construction that may be adapted in various educational settings. The framework can be expanded as future studies add new knowledge to this field of study. The findings will lead to the development of effective pedagogical strategies for IB teachers to encourage tacit knowledge construction among the students in their classrooms. In addition, recommendations will be provided to schools and policymakers on improving the IB program's efficiency in encouraging students from various cultural backgrounds to create tacit knowledge.

A collaboration between the University and secondary school, such as this study, promotes knowledge sharing between the two parties. New teaching and learning practices developed through research can enhance student learning outcomes and prepare them for higher education and future careers. Universities, in turn, understand the skillset and mindset of students entering their programmes. In addition, a commitment to research and academic excellence can enhance institutional standing. Consequently, it opens new research opportunities that provoke further investigation.

Pilot Study - Research Setting and School Background

An IB school in Hong Kong was chosen as an appropriate school to conduct the preliminary study. It is a school that is dedicated to IB education, offers Primary Years Programme (PYP), Middle Years Programme (MYP) and Diploma Programme (DP). The school follows a pupil-centered approach that strives to instill a sense of community and responsibility among its students. It has an international outlook that promotes cross-cultural communication and collaboration amongst its members. An entrepreneurial spirit that encourages new ideas and allows students to take risks is part of its DNA. Learning through inquiry, hands-on learning, and project-based learning are ways by which experiential learning is emphasised.

The pilot study helped in understanding the research context such as the IB programme, the learning environment and the key members. It provided an opportunity to test methodological

procedures and research methods. More importantly, as stressed by Lofland et al. (2006), choosing the site is crucial in testing the feasibility of obtaining rich data and achieving familiarity with the participants.

Data Collection Methods

A total of 12 observations and four interviews were conducted between April 2023 and May 2023. The survey questionnaires were sent out in June 2023. Participants in the observations and interviews comprised 48 students and four teachers. Only the teachers were interviewed. The students ranged from year groups 9 to 12. The students were part of the 127 who had taken the design subject. Each observation session lasted for 55 minutes. The purpose of the observations was to capture the dynamic interactions in the natural settings of the classroom. Therefore, the researcher adopted an unobtrusive position of a non-participant observer. Data was captured through notes, photographs, audio, and video recording. Notes were transcribed on MS Word.

Each interview lasted for 45 to 60 minutes, conducted over Zoom meetings. Interview questions were semi-structured based on the literature review and observations. Questions started with background questions on educational and work experiences and teaching approaches. This was followed by questions on the project brief, scaffolding of the design process, facilitation of tacit skills, role of technology in classroom interactions, strategies for solving group problems, and learning after school hours. Transcriptions obtained from Zoom meetings were saved on MS Word.

Survey questionnaires were sent out to all 127 design students. Questionnaires consisted of five sections: 1) Statement of purpose of the research with working definitions of tacit knowledge and social interactions 2) Background information which collected the demographics of students, 3) The design process - attitudes of students towards designing, 4) The role of classroom interactions in tacit learning – perceptions of students on the importance of interactions, time and attitudes in participating in critical discussions, 5) Extended study – motivation to study after school hours.

Data Evidence

The data collection was guided by the research questions and conceptual framework developed from the literature review. Supporting evidence sources consisted of project briefs, lesson plans and assessment criteria shared by the design teachers from each year group.

Data Analyses

The qualitative data analysis was adapted from the works of Miles et al. (2014), Merriam and Tisdell (2016), and Schatzman and Strauss (1973). The process began with transcribing the field observations. A summary sheet for each observed session was created, noting insights and possible interview questions. It was followed by interview transcription and progressed via coding, note creation and consolidation, and the development and breakdown of analytic categories related to the study issue. The coding methods were developed using the conceptual framework. The MAXQDA program was then used to create codes and generate memos.

A descriptive analysis was performed to simplify the data, identify patterns, pinpoint problems, and evaluate sources of error in the quantitative data (Loeb et al., 2017). The statistical studies were performed using SPSS, including frequency analyses, cross-tabulation, and variable correlation.

Finally, insights were drawn from the memos, which along with the quantitative analysis are interpreted into research findings as discussed in the findings chapter. This part of the analysis followed the 'integrative data analysis' procedure described by Creswell and Creswell (2023, pp. 246-247). The intent was to connect the two types of data as a joint display of quantitative scores and qualitative themes.

Findings for the Research Questions

Since there were many, only significant findings for each research question are discussed below.

RQ 1: How does the interactive environment of the International Baccalaureate (IB) classroom facilitate the construction of tacit knowledge among secondary school students?

An unstructured, open and flexible interactive environment facilitates tacit knowledge construction: The physical and visual elements observed in the classrooms, such as the seating arrangements and artefacts, made it possible for interactions. Teachers Bryant and Smith mentioned that an open environment allows students to look at and question each other's work. It also includes accommodating different learning styles, exploring through play (teacher Edward), and the freedom to express through multiple mediums (Bryant). The embracing of AI by all teachers added to the multi-dimensionality of the learning experiences. The visual environment in the classroom triggered a learning spark or provided design inspiration for 22.2% of surveyed students.

The liminal space of self-reflection and learning awareness is required for tacit knowledge construction: Teacher Taylor encouraged students to make and reflect on mistakes through the design cycle. The reflective element in each unit further enables the students to be aware of their learning process. Teachers use tools like tracking sheets, learning studios and google sites for reflection. According to teacher Bryant, students continue reflecting on the project outside the classroom by making real-world connections. 19% of them mentioned that self-reflection led to a learning spark in them (q7).

Most surveyed students were aware that they had learnt something new through classroom interactions (68.6%). This is evidence for tacit knowledge acquisition. Following are examples of what students learnt through interactions:

> "A different view or approach to both the solution of a problem and the problem itself (empathy and experiences)".

> "New skills for easier production, stepping out of my comfort zone and learning from mistakes".

> "I learnt a lot about each and every person's individual strengths and weaknesses".

A celebratory culture and a trustful and comfortable environment can encourage the construction of tacit knowledge: Using technology to facilitate interactive discussions allows students to "express their thoughts and ideas in a safe and supportive environment" (Smith). It includes entrusting students to take on learning responsibilities, such as taking leadership and initiatives to enable collaborative learning by creating groups and assigning roles (Bryant & Edward). Therefore, an interactive environment encourages collaboration and learning from peers. Teacher Bryant mentioned that he attempts to prioritise social needs over academic ones.

Apart from that, as quoted by teacher Edward, a culture that is a "celebration, or even the rewarding of failure in the classroom, can lead to an appetite for risk-taking and creativity". Correspondingly, 48.6% of students in the survey responded that they agree that they were willing to take risks in designing without fear of failure. Age had no significance with risk-taking ($p = .197$). Teachers Edward, Smith and Taylor added that the learning community in the classroom is built by empowering students, giving them a sense of belonging.

RQ2: What are the perceptions of secondary school IB students about the role of the interactive environment of the classroom for the construction of their tacit knowledge?

Value for collaborative engagement and critical discussions: Students were equally comfortable sharing opinions and ideas with their teachers and peers (44.3%). The two had a significant positive correlation ($p = .004$, Spearman Correlation Coefficient = .343), (Figure 3). A statistically significant positive correlation was seen between challenging others and being challenged by others ($p = .001$, Spearman Correlation Coefficient = .522), (Figure 4).

Nonparametric Correlations

[DataSet1] C:\POST DOC RESEARCH\IB\PILOT STUDY MALVERN\SURVEY\ANALYSIS\SPSS\sharing with teachers vs sharing with peers\raw data cleansed.sav

Correlations

			sharingwithteachers	sharingwithpeers
Spearman's rho	sharingwithteachers	Correlation Coefficient	1.000	.343**
		Sig. (2-tailed)	.	.004
		N	70	70
	sharingwithpeers	Correlation Coefficient	.343**	1.000
		Sig. (2-tailed)	.004	.
		N	70	70

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 3: Correlation between Sharing Opinions with Teachers and Peers

Nonparametric Correlations

[DataSet1] C:\POST DOC RESEARCH\IB\PILOT STUDY MALVERN\SURVEY\ANALYSIS\SPSS\challenging vs being challenged\challenging vs being challenged.sav

Correlations

			challengepeers	peerschallenge
Spearman's rho	challengepeers	Correlation Coefficient	1.000	.522**
		Sig. (2-tailed)	.	<.001
		N	70	70
	peerschallenge	Correlation Coefficient	.522**	1.000
		Sig. (2-tailed)	<.001	.
		N	70	70

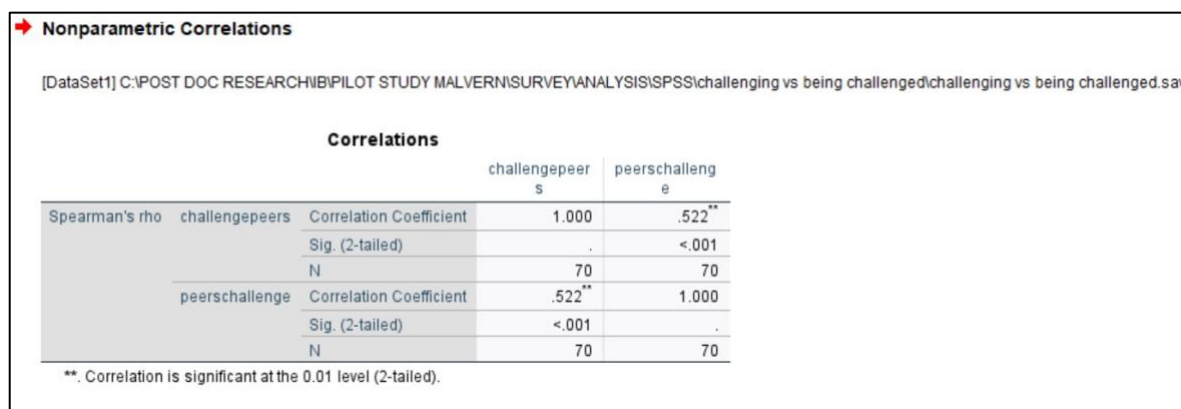**. Correlation is significant at the 0.01 level (2-tailed).

Figure 4: Correlation between Challenging and being Challenged by Peers

52.9 % of students sometimes participated (Y10 and Y11) in critical discussions in the classroom, followed by 35.7 % who often participated (Y9 and Y12). 52.9% said a moderate about of time was spent on critical discussions, followed by 31.4% who responded that some time was spent on the discussions. The participation of students had a significant and positive correlation to the time spent on the discussions (p =. 002, Spearman Correlation Coefficient = .358), (Figure 5).

Figure 5: Correlation between Participation and Time Spent on Discussions

Tacit learning through interactions: 42.9 % of students responded that interactions were moderately important, and 37.1% responded interactions were very important in gaining tacit skills. 68.6% of surveyed students were aware that they had learnt something new through classroom interactions. Most students (56.3%) responded that critical discussions through interactions had triggered a learning spark or provided design inspiration for them.

Motivation to self-study: 51.4% of students partook in after-school learning through self-study, whilst 31.4% engaged in a combination of self-study and interaction with their peers. Regarding motivation, a majority of students (51.4%) indicated intrinsic motivation, and 41.4% cited extrinsic motivation. Examples of intrinsic motivation were enjoyment in learning, self-interest, exciting topic, passion for the topic, learning something new and curiosity. Extrinsic motivation came from meeting deadlines, getting better grades, using external aids like music and YouTube videos, and betterment in their career.

RQ3: What challenges do IB teachers face to facilitate an interactive environment for effectively constructing secondary school students' tacit knowledge?

Overcoming distractions: The difficulty for IB teachers is creating an engaging and focused learning atmosphere, despite distractions. Teachers overcame this challenge by providing external motivation through competition (Bryant & Taylor), active feedback sessions (Bryant) and grades (Edward). An exciting project could keep students internally motivated (Smith). On the other hand, a grade-driven mentality could hinder learning (Bryant & Edward). Smith commented that students didn't look at written feedback from teachers.

Cultivating favourable interpersonal relationships: Dealing with conflicts and tensions within the groups was a challenge faced by all the teachers. Reasons included differences in group personalities (Edward) and learning styles (Smith), and different strengths and weaknesses of students (Edward & Taylor). Teacher Taylor added that the COVID pandemic had affected the social interactive skills of students. Although collaborative projects are challenging to

assess, they help students "develop skills like project management, branding, marketing, negotiating, and delegating" (Edward).

Obstacles in creative endeavours: Teacher Taylor explained students could not generate design ideas which affected design thinking and creative skills. He mentioned the absence of fundamental drawing skills necessary for creating effective visuals. While the other teachers believed that an open design brief leads to interpretation and exploration, Taylor felt that a broad design brief was difficult to understand. Thirdly, a lack of time was a constraint in holding meaningful discussions that could trigger creative ideas.

RQ4: How do IB teachers help secondary school students leverage their tacit knowledge?

Using the iterative learning approach in design: All the IB teachers emphasised using the design cycle, through conceptual explorations, brainstorming, ideation, testing and prototyping to leverage students' tacit skills. While teacher Bryant stresses hands-on experiences through prototyping and testing, teachers Edward and Taylor stress the reflective element is inherent and implicit in the evaluation stage. 51.4% of the students agreed that prototyping was extremely important to gain tacit skills in the design process, and 30% strongly agreed.

Helping students make real-world connections and cultivating empathy: Teachers set the design problems in authentic contexts that help students connect to their previous learning experiences. Students are urged to use empathy while problem-solving as it allows them to think through other people's perspectives (Edward & Smith). In the words of teacher Bryant, "Empathy is a powerful design skill and one that is difficult to quantify. It encourages personal investment and motivation in the work".

Promoting student agency: Teacher Bryant considers the IB curriculum a "wonderful platform for pupil agency". Rather than prescribing a problem, he prefers giving a context to students to recognise the problem. Teacher Edward stated, "I'm just facilitating learning and putting in a culture where those kids can take ownership and personalise their learning for themselves. I'm not telling them what to do". Teachers Edward and Smith consider student-led critical discussions can lead to success in group work and lead to an "appetite for risk-taking and creativity" (Edward). From a pedagogical stance, teacher Edward was inclined towards positioning himself at the same or lower level as the students, expecting the teachers and students to learn from each other.

Students are also encouraged to select a topic of personal interest to foster emotional engagement in their learning. 48.6% of the students agreed they preferred to identify a design problem that suited their interest. 28.6% were neutral, and 14.3% strongly agreed. Age had no significance in identifying design problems (p = .4). Accordingly, teachers mentioned they vary their instruction style to engage students and allow their products to be executed in various ways. It further implies that teachers understand the strengths and weaknesses of their students (Edward).

Meta Inferences and Discussions

Tacit knowledge construction is a continuous process of development and transformation. It needs a dynamic and adaptive interactive environment that is flexible and open, accommodates different learning styles, uses various educational tools for learning, and

provides multiple mediums for exploring and expressing ideas. In other words, a multidimensional IB interactive classroom that embodies the physical, sensory, social, and technologically adapted stimulates tacit knowledge construction.

The interactive classroom environment supports experiential learning in the design cycle. Students' tacit knowledge develops throughout the iterative design cycle process, in which they are actively engaged in hands-on learning, problem-solving, and critical conversations. Working in authentic contexts and real-life problems gives students the opportunity to apply previous knowledge, try new approaches through risk-taking and learn from failures. Students can apply different perspectives to problem-solve and develop critical skills by challenging each other in a healthy environment. Empathetic skills are honed when seeing the world through others' worldviews. Critical conversations with peers ignite creative and learning sparks.

Tacit skills aid the learning-to-learn process. Interactions in the classroom for tacit knowledge construction occur in different interactive spheres and spaces (Venkatesh & Ma, 2021). Primarily it is an internal interactive process where the external environment shapes meanings and values unique to each student. Therefore, the environment that supports meta-learning and meta-cognitive processes through self-reflection and learning awareness leads to self-discovery. Empowering students to personalise their learning develops intrinsic motivation and makes them proactive in their learning. It develops their attitude and mindset as lifelong learners, promoting intellectual growth.

The learning community of the classroom nurtures tacit knowledge construction. Trust is an important factor in building learning communities. While it means teachers relinquish their authoritative stance and facilitate sharing of learning responsibilities, it also means they need strategies to resolve conflicts and emotional upheavals in group learning. Establishing connections, especially after the COVID pandemic, is vital to build interpersonal relationships in the classroom. Technology plays an important role in improving communication skills and extending learning beyond the classroom. Furthermore, as IB students engage in community projects as part of their Diploma curriculum, they leverage the tacit knowledge of members of the wider community through hands-on activities and meaningful dialogue.

Table 1 summarizes guidelines for IB teachers to facilitate tacit knowledge construction in the interactive environment of the classroom.

Attributes of tacit knowledge construction	Method of Facilitation
Tacit knowledge construction is a continuous process of development and transformation.	A multidimensional IB interactive experience.
Students' tacit knowledge develops throughout the iterative design cycle process.	Active engagement in hands-on learning, problem-solving and critical conversations.
Tacit skills aid the learning-to-learn process.	Supporting meta-learning and meta-cognitive processes. Empower students to personalise their learning.

Empathetic skills are honed when seeing the world through others' worldviews.	Facilitate a healthy environment to challenge each other.
The learning community of the classroom nurtures tacit knowledge construction.	Build trust, create a democratic environment, engage in meaningful dialogue, embrace AI.

Table 1: Guidelines for Facilitation of Tacit Knowledge Construction

Conclusion

This study sheds light on the effect of interactive learning environments on the construction of tacit knowledge among IB secondary school students in Hong Kong. In doing so, it hopes to contribute towards improving students' learning outcomes and offer suggestions for curriculum development and strategies for teaching practices in the IB programme. Furthermore, the framework which will be developed through the empirical study can serve as a guideline to create interactive spaces for tacit knowledge construction.

Since this is an ongoing study, the size and selection of participants may seem limited. Due to lack of time and resources, it was not possible to observe all design classes in the IB programme. Further data by studying other IB schools can provide comparative analyses and enrich the research outcomes. Subsequently, the designed framework could be tested in other IB curricula through an intervention research design.

Tacit knowledge deserves a prominent position in education as it has the potential to "transform students into efficient learners and harness their capabilities as future innovators" (Venkatesh, 2021, p. 298). Moreover, tacit skills are not only lifelong learning skills, but they are the skills that will set students apart from AI-dominated skills in the future. Therefore, the study's implications can be extended to any educational scenario. Finally, the excitement surrounding the explosion of chatbots suggests new frontiers for this research in terms of new interactive spaces in the classroom.

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Students' Responses on Using Interactive E-module Based on Multimodal Text as a Self-Study Learning Resource for an English Structure Course

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Abstract

This study aimed to see how English students at one university in Indonesia responded on the use of an interactive e-module based on multimodal text as a self-study learning resource for an English Structure course, this e-module was developed in supporting digital-based learning at one public university in Indonesia. The research followed a systematic Research and Development (R&D) approach and applied the ADDIE model, which encompasses five stages: analyze, design, develop, implement, and evaluate. The e-module was designed to include animated videos and interactive quizzes integrated into a Flipbook maker application. It comprised six chapters, each comprising several sections: video explanations, text descriptions, examples, interactive quizzes, and chapter summaries. After the e-module was assessed as a valid learning medium by both media and content experts, the e-module was piloted to a group of students at the university under investigation. Their feedback demonstrated a very positive response, with the e-module receiving high ratings for its attractiveness (3.63) and convenience (3.58) aspects. Data from qualitative feedback also show that the students found it useful and interesting to use the e-module. Thus, it can be inferred that the e-module exhibits excellent quality, encompassing both content and media elements, rendering it a well-suited digital learning resource for the Intermediate Structure course within the English Department at the university under investigation.

Keywords: Interactive E-module, Multimodal Text, Learning Resource, English Structure

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Introduction

In the fast-changing landscape of education, the integration of digital technology has become a paramount driving force in transforming the way we learn and teach. This paradigm shift is evident across the globe, transcending geographical boundaries and making its mark in unexpected corners of the world. This shift is not only triggered by the fast developing nature of technology in every course of life in the last twenty years, but also facilitated by pandemic and life after pandemic itself (Kerres & Buchner, 2022). Digital based learning with a massive integration of technology into learning activities has been inevitable and a positive phenomenon in the education landscape (Susilawati & Budimansyah, 2019).

The integration of technology has been evidenced in many facets of teaching and learning, starting from learning resources, learning strategies, learning media, and learning tools. In the context of learning resources, in particular, many studies show that teachers have developed many e-learning resources which include learning media, video, game, as well as electronic module (Daud et al., 2022; Falloon, 2020; Rahman et al., 2019).

An e-module can be developed using multimodal text as it is evidenced that multimodal text can enhance the quality of communication, including the quality of learning resources such as e-module (Cahyaningati & Lestari, 2018). Multimodal text is a dynamic form of communication and diverse that combines various modes of representation in one text (Bezemer & Jewitt, 2010). This mode includes, however not limited to, written or printed words, images, sounds,symbols, gestures, and even spatial organization (Dicks et al.,2006). The essence of multimodal texts lies in their capacity to convey information, emotions, and messages through the interaction of these various modalities (Macken-Horarik, 2004). Unlike traditional text forms, which rely primarily on words to understand the meaning, multimodal texts make use of the power of various modes, which also create experiences that is richer and deeper for the audience.

This study is situated at on English Education Department oat one state university in Indonesia. It addressed issues of scarcity of digital based learning resources in this particular university. The need for developing e-learning resources is not only triggered by the fast developing of technology, but it is also pushed by the need for self-study learning resources for English students, particularly in the English Structure course. This study unravels a captivating journey into the implementation and impact of an interactive e-module infused with multimodal text elements.

Methodology

The interactive e-module was developed using a systematic Research and Development (R&D) approach, with the guiding principles of the ADDIE model – Analyze, Design, Develop, Implement, and Evaluate. This multimodal based e-module showcases an amalgamation of engaging elements, ranging from animated videos to interactive quizzes, all seamlessly integrated into a Flipbook maker application. It is a comprehensive six-chapter resource, each chapter meticulously structured to encompass video explanations, text descriptions, illustrative examples, interactive quizzes, and chapter summaries.

The e-module developed in this study was tried out and used by students under investigation. This particular study reports one of the ADDIE stages, which is the implementation phase,

and seeks to find out how the students responded to the e-module which has been developed. Their responses were recorded and collected by distributing a set of questionnaires.

The research participants consisted of 42 students from the batch of 2022 who were registered at Faculty of Teachers Training Program, English Department, at one university in Indonesia. Data collection was carried out through a Likert scale questionnaire consisting of statements asking for student responses to the use of the Interactive E-Module, where a score of 1 indicates disagreement and a score of 4 indicates high agreement. For the analysis of the data, the researcher used SPSS 25 and then classified them utilizing the criteria by Sugiyono (2016), as displayed in the table below:

Table 1. Validity Criteria

No	Interval Mean Score	Validity Category
1	$3.25 \leq x < 4$	Very Good
2	$2.5 \leq x < 3.25$	Good
3	$1.75 \leq x < 2.5$	Bad
4	$1 \leq x < 1.75$	Very Bad

Apart from the quantitative data, there is a comments and suggestions column at the end of the questionnaire which is intended to obtain qualitative data as support and enrichment of the quantitative data. This method was chosen to allow the researcher to measure student responses in more detail and to understand their perceptions and experiences of using Interactive E-Modules in the context of independent learning. With this approach, it is hoped that this research can provide deeper insight into the effectiveness and student acceptance of technological innovation in the context of English education.

Findings and Discussion

Quantitative Analysis

There are two aspects of the e-module that students were asked to evaluate. They are aspect of conveniences or user-friendliness and aspect of attractiveness. For each aspect, there are two indicators. For aspect of conveniences, students had to evaluate the ease of use and clarity of language used. Meanwhile, in the aspect of conveniences, there are display of the e-module and presentation of materials and questions.

1. Aspect of Attractiveness
The result of students' responses regarding the attractiveness of the interactive e-module:
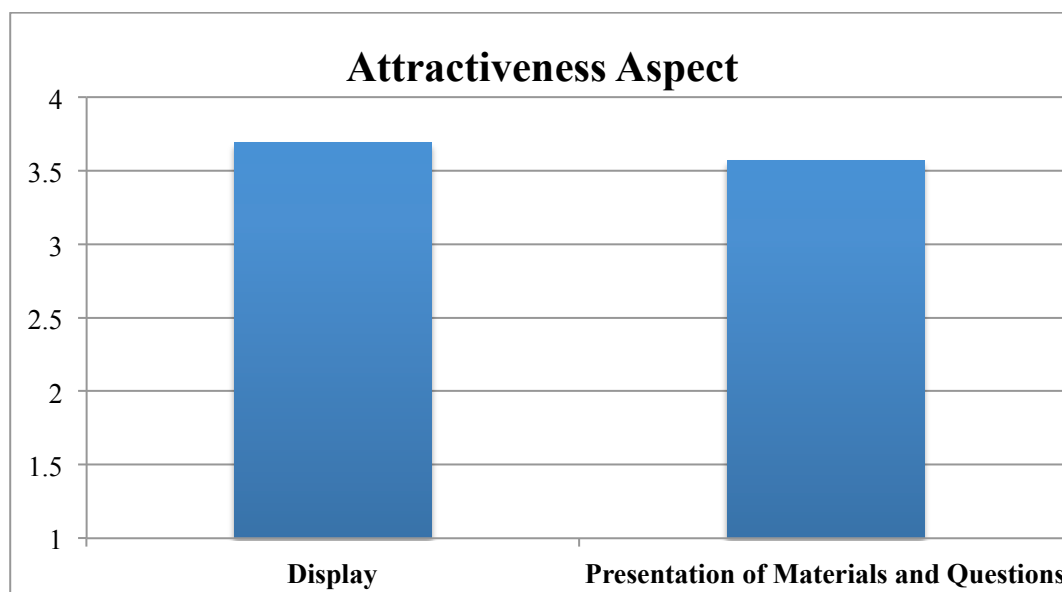
Figure 1. Graphic of Attractiveness Aspect

According to the results of the Likert scale questionnaire, students gave the multimodal text-based Interactive E-Module a *very good* rating for its attractiveness in terms of the appearance of the learning medium (3.69) and the presentation of the content and questions in the learning medium (3.57). These scores are quite close to 4, showing that the E-Module's appealing look and the manner in which the information and questions are delivered have been well-received by students as a whole. An enticing display may include the use of attractive graphics, images, and colors, as well as a neat arrangement that effectively attracts students' attention. Presenting interesting material and questions may also include the use of interesting language, variations in question structure, and the use of relevant examples and illustrations.

The results suggest that multimodal text-based interactive e-modules have a lot of potential as engaging teaching resources for students. Success in achieving high scores indicates that students responded positively to the use of technology in education, especially when the display and presentation of the material is well designed and attractive. In light of this positive development, educational institutions and curriculum designers can concentrate more on creating engaging and interesting learning materials and using a variety of multimodal texts to pique students' interest in learning English and enhance the standard of instruction.

2. Aspect of Convenience
The result of students' responses regarding the convenience of the interactive e-module:
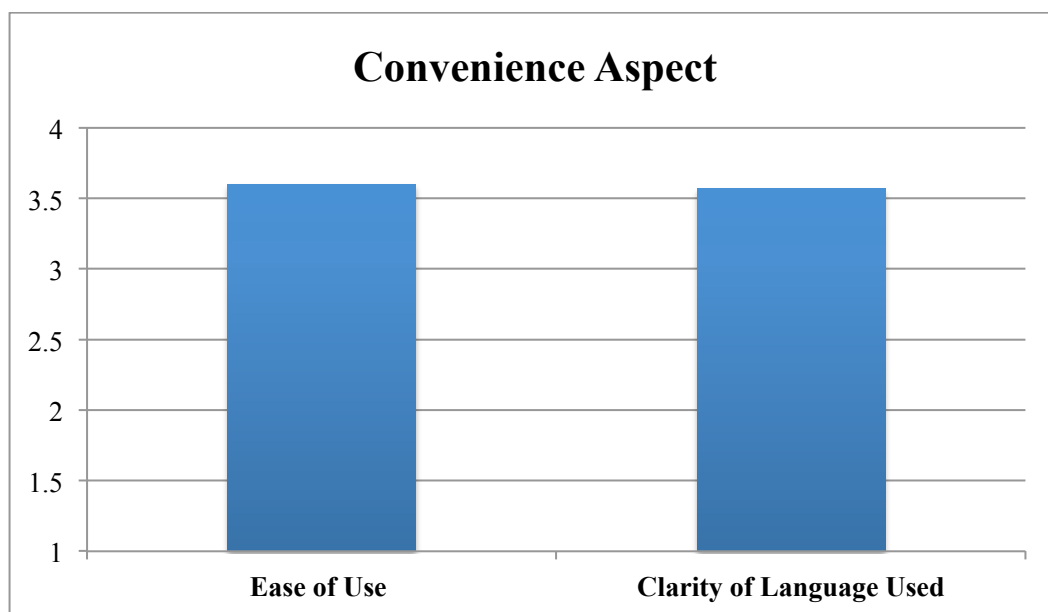
Figure 2. Graphic of Convenience Aspect

Figure 2 shows that students also responded favorably to the aspect of ease of use of the multimodal text-based Interactive E-Module. Of the two examined indicators, clarity of language used in the module obtained an average score of 3.57 (*very good*), while ease of use received an average score of 3.6 (*very good*). This suggests that students find the Interactive E-Module to be a useful learning tool and that they find the language used in the module to be simple and straightforward. The Interactive E-Module's display and navigation need to be properly planned so that students can easily access and understand the material. Increasing ease of access and clarity of language in this module can help upgrade the effectiveness and efficiency of students' independent learning, which in turn can produce better learning outcomes in their English Structure course.

As a whole, the result of students' responses on using interactive e-module based on multimodal text as a self-study learning resource for an English structure course is as follows:
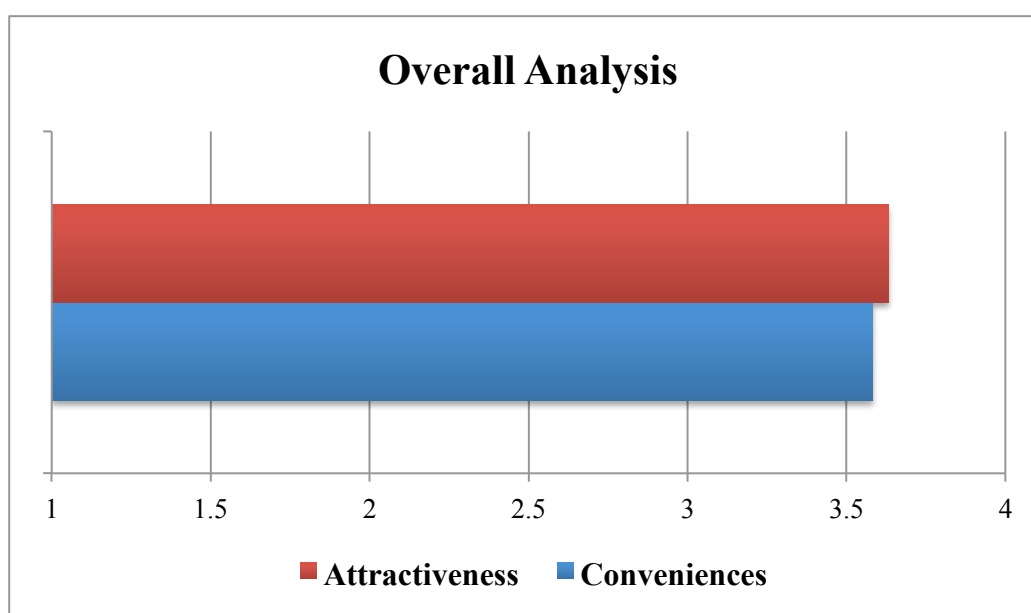
Figure 3. Students Assessment of the E-Module

Based on these findings, using a multimodal text-based Interactive E-Module as a stand-alone learning resource in the English Structure course received favorable feedback from students. Particularly, the average convenience aspect scored 3.58 (*very good*), while the average attractiveness aspect earned a score of 3.63 (*very good*). These findings demonstrate that most students find the Interactive E-Module to be interesting and simple to use. These two characteristics complement one another and have about equal weight, proving that appeal and usability are important determinants of student adoption of digital learning material.

Qualitative Analysis

For qualitative analysis, the data came from students' opinions after using the Interactive E-Module. As a whole, students' comments about the e-module can be grouped as follows:

Table 2. Categorization of students' comments

No	Themes	Frequency
Reasons for Positive Responses		
1	Enhance students' understanding	10
2	Increase students' learning interest	6
3	Facilitate students' self-directed learning	1
Favorite Features		
1	Interactivity	9
2	Flexibility for the students' learning speed	1
3	Accessibility	2
4	Visualization	4
5	Language	1
6	Simplicity	1
7	Contents	1

As can be seen from the table above, many students agreed that the e-module can improve their understanding of the subject matter. Ten comments from students underlined its effectiveness as an interactive learning medium that makes the material more interesting and simple to comprehend.

> "*I feel that this e-module is easily accessible to everyone, and the materials provided are concise and clear, making them easy to understand.*"

> "*In my opinion, the development of this interactive e-module will have a very positive impact, especially in increasing students' understanding.*"

In addition, they complemented the high positive interactions in the learning process, including interactive media features such as video and audio. Students also stated that they appreciated the ease of access and convenience, which makes it easier for them to direct their own learning.

> *"Because it actively engages students, this interactive learning medium is, for me, very suitable for encouraging us to take an active role in our own learning. As students, using engaging media like audios and videos really improves our understanding."*

Then six students commented how this e-module helps improve their interest to learn. They emphasized how this cutting-edge medium successfully held their interest throughout the learning process.

> *"Really help us broaden our perspectives and enhance reading interests."*

> *"I think this innovative interactive E-Module is highly effective in generating interest in the learning process, especially in the English Structure course. The interactive learning style makes the study materials easier to understand and fun."*

The interactive nature of the learning media has sparked enthusiasm among students, providing a unique and compelling learning experience that fosters a deeper interest in the subject matter.

Seven essential elements of the E-Module have been recognized by the students as having made a major contribution to their successful learning process. First off, nine students made a comment about the module's interactivity. This makes learning more dynamic and interactive by getting them actively involved in the process.

> *"Very interactive. It's like a mood booster for students, making the learning experience more enjoyable.*

Secondly, because of its adaptability to various learning styles, a student commented about how the e-module lets students learn at their own pace. This ensures that everyone has a thorough comprehension on their own.

> *"The module gives flexibility for us, students, to study at our own pace. And I feel more engaged in the learning process."*

Thirdly, because it is easily accessible, a couple of students appreciated that they could learn without interruption at any time or location.

> *"I love that this e-module is easily accessible to everyone."*

Fourthly, several students praised the incorporation of visual components because it facilitates the clear and understandable presentation of difficult concepts, which in result improves the subject matter's overall comprehension.

> *"The images provided really help us understand the topics and keep our interest."*

In addition, a student complimented the English used in the e-module for its conciseness, so that students with different skill levels can easily learn from it.

> *"The language used in interactive learning media aids in understanding the conveyed materials."*

Also, the interface and design of the module are straightforward, which makes it simpler for students to use and ensures that they can easily navigate through the content.

> *"In my opinion, this e-module is a very interesting innovation because it has a simple, informative, and interactive design, utilizing digital technology."*

Finally, the module's extensive and diverse content covers a wide range of topics giving students a comprehensive understanding of the subject.

Discussion

In the quickly changing environment of 21st-century education, there is a growing understanding of the necessity for creative and dynamic learning tools (Henrikson et al., 2016; Cummings & Blatherwick, 2017). Evans (2001) noted that traditional teaching methods, which were largely centered on textbooks and lectures, are rapidly giving way to more interactive and technologically oriented ways (Alismail & McGuire, 2015). The dynamic requirements of 21st-century learning are demonstrated by the interactive e-module. It can enable students to interact with the content in ways that are in line with current learning trends by providing a variety of multimedia components (Nabayra, 2020; Sanova et al., 2022; Mahmudah et al., 2022).

The responses from the students show how user-friendly and engaging the e-module is. The reason is probably because lessons in multimodal media like this go right to the point most of the time (Purwaningsih et al., 2022) and maintain students' attention and interest longer than traditional learning methods do (Saryadi & Sulisworo, 2023). According to Kustandi and Darmawan (2020), if the medium being used is able to effectively and succinctly convey the lessons, the learning and teaching process will be successful. In order to capture and hold the students' interest, the e-module was also created to be straightforward and pleasing to the eye. This was in line with the premise that instructional materials needed to be compelling—for example, they needed to have appealing designs and layouts—in order to inspire students to study them (Midoro, 1993; Sari, 2021).

One of a multimodal e-module's major benefits for students is the capacity to cater to the various learning needs and preferences (Sankey et al., 2011; Campoy-Cubillo, 2019). Loo (2004) emphasized that students are not uniform. When it comes to learning, they each have particular aptitudes and manners (Cabual, 2021). Some individuals may learn best visually, taking advantage of pictures and diagrams, while others learn best audibly (Zhen, 2016). The multifarious character of the e-module in this case expands learning beyond customary text-based formats (Bouchey et al., 2021).

Although text is still crucial, adding visual, aural, and interactive features improves the learning process altogether (Mayer, 2017). In particular, visual learners benefit from visual aids like graphics, photos, and diagrams since they help improve concept comprehension and memorization (Vanichvasin, 2021; Al Said & Al Said, 2022). Audio elements, such as narration and instructional direction, additionally boost accessibility for auditory learners (Coombs, 2010). On top of that, interactive components like quizzes turn passive learning into active learning, encouraging critical thinking and problem-solving abilities (Mwalongo, 2014; Nurhasanah & Fauzan, 2021).

Besides fitting various styles of learning, the multimodal e-module provides other advantages. For instance, it raises motivation by increasing the enjoyment and engagement of learning (Girón-Garca & Gargallo-Camarillas, 2020). According to Sanmugam (2017) and Alsawaier (2018), adding interactive components, gamification features, and multimedia elements captures students' interest and boosts their intrinsic drive to learn. This makes this e-module an invaluable educational resource since it develops a deeper degree of involvement in addition to helping to improve comprehension (El-Sabagh, 2021; Logan et al., 2021). Also, quizzes and other interactive components in the e-module provide students with instant feedback. This feedback can be critical and beneficial when it comes to assisting students in identifying their strengths and limitations (Harvey, 2003; Mandouit, 2018). Feedback is crucial for learners since it clarifies what has been mastered and what still needs work. As a result, students can identify particular ideas that need more explanation and return to them as necessary.

Conclusion

To sum up, the adoption of the Interactive E-Module Based on Multimodal Text as a Self-Study Learning Resource for an English Structure Course has received favorable responses from the students, demonstrating its effectiveness in accommodating a variety of learning preferences and styles. This innovative technology has not only piqued students' interest but also fostered a deeper comprehension of difficult ideas through its dynamic and engaging approach by adding interactive and aesthetically pleasing aspects. In addition, the availability of immediate feedback has allowed students to pinpoint their areas of strength and development, resulting in a more individualized and successful learning experience. As evidenced by the overwhelmingly positive student feedback and supported by the scholarly literature, the integration of multimodal e-modules represents a crucial advancement in educational technology, marking a significant step towards creating an inclusive and effective learning environment for students in the 21st century.

As this study unravels, it becomes increasingly evident that this e-module is more than just a digital resource; it is a beacon of quality that extends its reach to both content and media elements. With these compelling findings, it is apparent that this innovative learning resource has the potential to redefine the landscape of education within the English Department at the university under investigation and holds the promise of becoming a model for digital learning resources in the region.

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Using 5 Music Instructional Methods to Illustrate the Social Constructive
Music Teaching Framework in Hong Kong Primary Level Music Education:
A Comparison Study Between Private International and Public Schools

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Abstract

Music education under the frame name of arts education has been integrated into the primary and secondary education curriculums in Hong Kong for more than 20 years, starting from 2001, the year of launching the *Learning to Learn* curriculum for the reconstruction of the education system for the younger generation. Music education, embedded into the arts education, was therefore regarded as one of the key subjects to cultivate and uplift student holistic development, focusing on aesthetic skill training and moral growth development. This research was an exploration study of music teaching practices from two private international and two general public school music teachers at the primary school level. The value of this study rested on borrowing the idea of Shulman's pedagogical content knowledge (PCK) principle to create a social constructive music teaching framework from five commonly-used instructional methods, namely Orff, Kodaly, Dalcrozes, Suzuki, and Gordon's approaches. Based on the evaluations of these four case studies, hypotheses on the differences in the PCK were tested with the types of schools and found to be no difference. The preliminary results suggested that music teachers in private international schools had similar pedagogical approaches to music instruction to teachers in aided-public schools. Additionally, the modeling, guiding, and training approach was identified as a grounded teaching method for music education at the primary school level regardless of different types of schools. Other implications like the further development of the framework were discussed.

Keywords: Pedagogy, Social Constructivism, Music Education, Primary School, Hong Kong

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Introduction

Music Education in Hong Kong

In Hong Kong, music education plays a predominant role in value education, which is to foster the holistic development of students and cultivate their positive values and attitudes for life-long learning. The curriculum reform in 2001, *Learning to Learn – The Way Forward in Curriculum Development classified music and visual art subjects into arts education, as one of the* eight Key Learning Areas (KLAs), comprising Chinese language education, English language education, mathematics education, science education, technology education, personal, social, and humanities education, arts education, and physical education (Education Bureau, 2021, 2023). According to the Curriculum Development Council (2017), the KLAs were positioned to help students develop aesthetic skills, meaning creativity, critical thinking, sensitivity, cultural awareness, effective communication skills, art knowledge, positive attitudes, and values. Under the frame name of arts education, music education had four pre-set learning targets including 1) developing creativity and imagination, 2) developing skills and processes, 3) cultivating critical responses, and 4) understanding arts in context. All these learning targets were clearly outlined in the primary and secondary curriculum reform. Also, there was no standardization of time, criteria, syllabus, and assessment for teaching music, but around the year 2003, a structural curriculum was published, informing every school should allocate at least 10% to 15% of the total lesson time to achieve better the long-term educational goal of all-rounded development of the students.

Qualifications of Music Teachers in Schools

Traditionally, to be qualified school music teachers in Hong Kong, they have to hold a government-funded postgraduate diploma in education and attain a bachelor's in music. Institutes in Hong Kong, like The University of Hong Kong, The Chinese University of Hong Kong, Hong Kong Baptist University, and The Education University of Hong Kong or abroad education can provide education and music training (Education Bureau, 2008). The qualification of registered music teachers is rigid and standard. Teachers generally need to meet the criteria of playing at least one instrument at grade 8 or above level from recognized music conservatories or universities. The known accreditations of instrumental examinations are issued by The Association of Board of the Royal Schools of Music, The Trinity College London, and The Hong Kong Trinity College Centre. Due to the fluctuation in the demand and supply of qualified music teachers, some teachers who are under education diploma training with supervision offered by their schools or holding a bachelor's degree in education with strong instrumental training are also eligible to teach, and the school principals have the final decisions to employ them during the teacher apprenticeship at managing schools.

Literature Review

The Nature of Private and Public Schools

Hong Kong was a colonized city under British rule before the handover in 1997. Thus, the education system followed the well-established United Kingdom's. According to the Census and Statistics, 593 primary schools were government fully funded or subsidized, and 39 international primary schools in Hong Kong (Education Bureau, 2023). The differences between these types of schools were the operation modals and the school fee payers and its supporters, reflecting the choices of curriculum and assessment design in education. Private

international schools are targeted to provide education specifically for immigrant children with the possibility of mixing cultures in Hong Kong. The program mainly follows the International Baccalaureate (IB), and it is an inquiry-based, transdisciplinary curriculum, with a student-centered approach to education for children as early as 3 years old until 12 years old (International Baccalaureate Organization, 2023). This curriculum is supported by social-constructive learning theories, stressing the collaboration and integration of different knowledge into one single learning element. Different from private international primary schools, public or subsidized primary schools follow the Education Bureau's Primary Education Curriculum Guide which is developed based on authentic and practical experiences of schools, local research, policy contexts of Hong Kong, and different perspectives of international development. This curriculum is also student-centered and framed for children aged 6 years old to 12 years old, while the best description of its design purpose is to cater to diversified learning and teaching through different assessments and strategies.

Music Instructional Methods

School music teachers not only need to learn to play an instrument skillfully but are equipped with thorough music knowledge for teaching. Their approaches to teaching can be varied while the music training owned are universal, meaning that they share the common ground of music instructional methods, developed by five profound music school educators, namely Carl Orff, Zoltan Kodaly, Emile-Jacques Dalcroze, Shinichi Suzuki, and Edwin Gordon.

Carl Orff

The Orff approach, which was also called Orff-Schulwerk (schoolwork), was child-centered with a philosophy that "children have not liked to study since the beginning of time" (Hughes, 1993). He strongly believed that children preferred to play, and a teacher should work on how to have their interests at heart to let them learn while they play. His approach was not systematic but sequential in training advanced learning skills from Bloom's Taxonomy perspective, from remember, understand, apply to analyze, evaluate, and create. As Orff's musical training was heavily involved with musical instruments, his approach was experimenting and improvising, it helped children to build their musical skills through four stages, including imitation, exploration, improvisation, and composition (Shamrock, 1997). Children simply learned music language, sounds, timbres, rhythms, melodies, and tonal material around them to create sounds. Orff's approach also stressed utilizing instruments, singing, movement, and speech to cultivate children's innate musical ability.

Zoltan Kodaly

Kodaly's method was another well-known approach to music education and child-centered. The music training of this method was singing, and he believed that singing provided a solid foundation for all beginners and children should learn to read music before having instruments to play along with (Kodály, 1974, p. 201, 204). His approach was highly sequential, and he taught children how to read scores, clap the rhythms, and sing the pitches, and each time added one new note or rhythm syllable. Compared with other educators, Kodaly preferred to tailor-make his teaching materials to suit his preference for quality teaching. Although he was notorious for his hand signs method which allowed children to visualize the spatial relationship between notes, he was not the inventor, but Sarah Glover's

Norwich and Curwen for their solfege system. Also, Kodaly was renowned for using body movement including clapping, walking, and running to enhance rhythm learning.

Emile-Jacques Dalcroze

Dalcroze's approach was called eurhythmics, meaning to incorporate rhythms, structure, movement, and music expression when playing music. He emphasized the sychrome of mind and soul. To develop musicianship, he/she should work on their sensitivity and expression which was the best way to awaken the physical, aural, and visual images of music in the mind through practising solfege, sight singing, ear training, improvising, phrasing the music, etc. (Anderson, 2012). The music learning was sequential. For instance, the demonstration of the teachers played an important role, students were encouraged to imitate and use body movement to learn, like walking, running, swinging, jumping, etc. Then, when the music changed in speed, the students needed to respond to this with verbal signals. The key was a quick-act reaction. After this learning, students could imitate and advance by echoing, which was called the interrupted canon. Students needed to clap a phrase, and their partners followed the same and clapped a phrase. A canon was to echo it back the pattern. This reflected and formulated group or peer learning.

Shinichi Suzuki

Shinichi Suzuki adopted a mother-tongue approach to learning music, which was an approach similar to language acquisition. For example, children started with reading and comprehension. After this sense of learning had been established, children were ready for any music learning or instrument learning. He preferred that children developed music in a loving and caring environment, with less competition. One important element of his approach was to encourage parent involvement and the training could be as early as three to four years old. The major essence of Suzuki's approach was focused on ear training, playing the repertoire, and group learning (Suzuki, 1993; Suzuki & Nagata, 1999).

Edwin Gordon

Edwin Gordon's method was called Music Learning Theory. He borrowed the idea of language development during infancy and proposed a new concept called 'audiation'. Audiation was a sequential learning process and was divided into 8 types, like listening, reading, writing, performing from recalling, creating and improvising (Gordon, 2007). According to Gordon (2007), children audiated music to develop music vocabularies through music thinking. Vocalization and recognition of the sound were started by repeated hearing of the rhythm chants, songs, rhythm patterns and tonal patterns. The expansion of the music vocabularies allowed them to imitate, improvise and communicate in music. In the classroom, school-aged children experienced music holistically, explored the tonal and rhythm patterns, as well as adding meaning to the music when they composed. Teachers gave guidance and intervened in their learning to fasten and consolidate the audiation process of the students.

Teaching Beliefs and Practices in Social Constructivism

In teaching, teacher knowledge and beliefs were intertwined to constitute teacher competency and professionalism, which could lead to different teaching outcomes and pupil performances (Bromme, 2005; Konig, 2012). The conduct of teachers was not only affected by the knowledge but also relied on the teachers' beliefs according to Konig (2012), Blomeke

(2002), and Ertmer (2005). For example, teachers tended to adopt a constructivist approach rather than a transmission view when they held a dynamic belief like the subjects instead of a static belief. The constructivist approach was derived from Vygotsky's social learning theory which proposed that children could develop their cognitive abilities and understanding from social environment, culture, and modeling. Social interaction was regarded as a process for learning and cooperative or collaborative dialogues were the facilitation of the cognitive development supported by adequate language ability to learn (Vygotsky, 1986). Some findings reflected that when the teachers held a belief in the good use of technology for student learning, it had a causal relationship with the impact on success (Basturkmen, 2012; Schoenfeld, 1998). Thus, scaffolding, allowing repeatedly brainstorming and poring over the questions, helps in shrinking the gap between the actual and potential learning, called the Zone of Proximal Development (ZPD). More dynamics and deep learning occurred when teachers believed in the advantages of social constructivism and applied technology tools in teaching. In the meanwhile, collaborative and group learning were facilitated among teacher-to-student and student-to-student discussions in class.

Shulman's Pedagogical Content Knowledge

Lee. S. Shulman (1985, 1987), as an education emeritus, evocated teaching professionalism. Teacher knowledge sufficiency was always put on the table to be discussed. The categories of this knowledge base had an array of requirements, including content knowledge, general pedagogical knowledge, referencing to the broad principles and strategies of classroom management and organization, curriculum knowledge, with a particular sense of program structuring, pedagogical content knowledge, referring to the special amalgam of content and pedagogy of the province of teachers, knowledge of students and their characteristics, knowledge of educational contexts, such as working groups, classroom, school finances, religions and cultures, and knowledge of educational ends, purposes, philosophy and historical grounds. Among the above knowledge base categories, the pedagogical content knowledge (PCK) was the interest in knowing the teaching practices, varying from different subjects since it represented the blending of content and pedagogy into an understanding of how particular topics, problems, issues, organized and adapted to the interest and ability of the learners, and presented for instruction. Blomeke (2002) suggested that content knowledge and pedagogical content knowledge could be viewed as epistemological beliefs, in which teachers could see the dynamic nature of the knowledge when they reached the mastery level, implying that teachers who saw those dynamics usually adopted the constructivist approach rather than didactic teaching style because of sufficient knowledge base and the deep understanding of their students.

Recent Music Education Research in Hong Kong Context

The idea of PCK was crucial since this was used to create a music education teaching framework under the social constructivism approach. Before that, recent studies were reviewed to understand different aspects or domains of music education in Hong Kong. For example, Ho (2007; 2013) conducted music education research with a focus on cultural value development. Leung (2021) showed that there was a trend of interest among Guangdong and Hong Kong music teachers to impart Cantonese operas at schools for both primary and secondary schools. Wong and her colleagues (2014; 2019) investigated the assessment practice and teachers' efficacy of 97 secondary school music teachers and 309 primary school music teachers. Cheng and Lam (2021) also put efforts into measuring the online teaching effectiveness in music education during the COVID-19 situation. The years of gap of

investigation and small group researchers reflected that the research development in music education was underdeveloped in Hong Kong.

Present Study

As mentioned, the concept of Shulman's PCK was the key in this study. It was a guideline to differentiate good teachings and bad teachings. The five music instructional methods that were the essence of social constructivist music teaching and the Bibles of the good teachings. It was also common knowledge among music teachers who should have shared music knowledge. This research author had identified the notions of different music teaching elements, and these were coded as nodes. For example, Orff's approach suggested learning from playing and Kodaly's was learning from singing. Then, there were two nodes. Some instructional methods shared the same way of teaching, like using movement among the founders of the music instructors. In this case, it was counted as one node. A social constructivist music teaching framework therefore was analysed and coded based on the literature review of the music teaching methodologies and nineteen nodes in total were identified with the understanding of the PCK (Appendix I). This study firstly could locate and explore the differences between private international and public-aided schools. Secondly, it tried to examine the possibility and effectiveness of the framework for showcasing music teaching in Hong Kong. The following were the hypotheses drawn:

H1: The higher the coverage number of music pedagogical content knowledge nodes the teachers have, the higher the chances the teachers adopt a social constructivist approach to teaching.

H2: There is a difference between private international schools and public schools in terms of the coverage number of music pedagogical content knowledge nodes.

H3: Teachers at private international schools tend to adopt the social constructive approach to teaching than teachers at public schools.

Methodology

Research design. The axis of this research was in-depth case studies of understanding the primary school music teachers' real teaching practices through the denoted pedagogical content knowledge nodes. It was a small-scale research, adopting the mixed methodology design including survey and interview (Denscombe, 2017). Teachers' backgrounds such as teachers' qualifications, years of experience, the preferences of pedagogies, and the uses of assessments were asked in the survey and further sought clarifications and elaborations during the interviews. Therefore, the teachers were required to complete the 20-minute long survey before half an hour of the interview, which was a one-on-one approach.

Participants. Four music teachers were recruited based on the criteria sets, in which the first criterion was to recruit current full-time music teachers who were working at primary schools in Hong Kong. The second rule was to have music teachers from public/ private/ international schools that have diversity in curriculums, syllabus, schools' mottos, values and resources, and development trends to address the find out the differences among different types of schools. In the end, two music teachers were working at international schools and the other two were teaching at aided public schools which matched the criteria set through convenient sampling.

Survey. The purpose of the survey was to collect the background information of the music teachers. It was a short-item survey, designed to be completed in 15 to 20 minutes. This provided a sense of what was going to be asked in the interviews and the survey was related to the personal and school background information, pedagogies, assessment design, generic skills, school resource allocation, and operation in musical activities. No personnel-identified data was collected. For example, the teachers did not need to disclose their names and which schools they were teaching at. Overall, the average completion time used was more than expected, which was 25 minutes on average.

Interview. A semi-structured interview was used and based on the pre-designed protocol (Appendix II) (Cohen, Manion, & Morrison, 2018). The researcher conducted the interviews on a one-to-one basis and in a sequential manner. Follow-up questions were allowed for the sake of getting more detailed explanations from the participants. The major reason for adopting a one-on-one approach was to collect a personal view on music teaching with fewer comparisons because of the prerequisite criteria sets, i.e. different school types. The total time needed for the interviews was from 30 to 45 minutes each.

Data collection. An interview protocol was tailor-made for this study. The data collection period was held between June and July 2022. There was around a month for distributing the survey and conducting the online interviews with the teachers. Once the consent form was signed, the interview session was arranged based on the teachers' suggested time slots. The whole interview processes were recorded and transcribed by the researcher. Each participant's recording was saved and renamed the teachers' files named 'MT', an abbreviation derived from the term 'Music Teacher'. Four cases were collected for analysis.

Data analysis. Descriptive statistics on teachers' and schools' backgrounds were tabled (Appendix III). The researcher worked on the transcription after all the interviews were done and coded it based on the social constructive music education framework. By counting how many different variations of music pedagogical content nodes each teacher had, the variations in teaching methods could be uncovered. A Wilcoxon signed-rank test was adopted to test out the significance between private international and aided-public schools. Content analysis was put forward to analyze the pedagogies and activities the students had. Since the study was conducted during pandemic times, some of the technological challenges and innovative solutions were identified and reported.

Results

Cases' Teaching Backgrounds

Music Teacher A was an international school male teacher with more than 10 years of teaching experience. He held a master's degree in music education and a certificate of teaching diploma. He attained the US Music Certified Music Exam level 10 piano and level 5 violin. The major pedagogies he used were experiential, inquiry, and cooperative learning. For the assessments, it had numerous types but mainly listening tests, peer assessments, and classroom performance. During the interview, he said that he was the solo music instructor at his school, managing all forms of the music curriculum, even extending to the kindergarten.

Music Teacher B was an international school female teacher with 4 to 6 years of teaching experience. She graduated with a master's degree of music education, as well as a teaching certificate. She got an Associate Level of Trinity College London in piano and Grade 8 in

theory. The major pedagogies used were inquiry, cooperative, and experiential learning. The assessment of the class included classroom performance, worksheets, and practical and listening tests. According to her interview, she claimed that the school decentralized the ways of teaching music since it was not the core subject, and the curriculum and format were solely designed and managed by her with one teaching assistant to support. She had more than 500 students and the schedule was always tight. Yet, she expressed that she was delighted to have a high degree of controllability in teaching and delivering her concept of music education.

Music Teacher C was a male teacher with more than 7 years of teaching experience. Different from the other teachers, he was also a mathematics teacher and worked at the aided public school. He held a bachelor of education, majoring in mathematics and minoring in music subjects. He had Grade 8 in piano and Grade 8 in theory. The major pedagogies he adopted were experiential learning, assessment & evaluation of student learning, and differentiated instruction. Worksheets and practical and listening tests were the typical strategies to impart music training to students. In the interview, he said that the school principal encouraged students to learn an instrument and he was part of the team to manage an orchestra with the students. This school had 5 music teachers responsible for different classes and he almost took charge of all forms of students in music, but it was expected the burden was less.

Music Teacher D was a male teacher with the least teaching experience, which had less than 3 years. He was currently studying for a master's degree of music education and a teaching diploma. He held a Grade 8 trumpet and worked at an aided public school. The major pedagogies used were assessment & evaluation of student learning, open-ended instruction, and integrated learning. Same as another public school music teacher, he graded students with worksheets and practical and listening tests. During his interview, he stressed that the school was result-oriented, thus he had to deliver student academic results to the principal. The test-based system was a plausible and effective way to show, and he reflected that he used many worksheets to explicitly reveal the grades. His school had 7 music teachers and he said that the workload was not high and was teaching primary 1, 2, 3, and 6 students.

Pedagogical Content Knowledge

Nineteen nodes were identified as the keys to the ways of teaching music at primary schools (Appendix I). It was hypothesized that there was a significant difference between private international and aided-public schools in the use of pedagogies. The Wilcoxon signed-rank test was applied due to the non-parametric distribution and the small sample size. With a 95% confidence level, there was no difference in the coverage number of pedagogical content knowledge nodes between the private international and aided-public schools, $V = 57$, $p = 0.40$, thus it was hard to conclude that the music teachers at the private international schools held a more dynamic teaching style than those at the aided-public schools.

Modeling, Guiding, and Training: Singing, Clapping, Movement

The similarities of the music teaching approach were using modeling, guiding, and training. All schools' teachers showed their music knowledge and pedagogies when sharing their experiences of teaching. Teachers as the sole educators in the classrooms need to pay attention to the body, control, and movement of the children's learning. They started by singing, added a little bit of body movement to express rhythms, and further learned to use

fine motor skills through instrumental learning in music education. Cognitively, the teachers raised the requirements when students turned to the higher grades.

> *"You have rhythm, melody, timber, harmony, dynamics, forms, and expressive elements. That is the basic of teaching music from the youngest one to the older ones…You cannot teach hemiolas to the younger ones because they won't understand that. You cannot teach syncopation to the younger ones because they won't be able to understand that as well... If you're going to teach regular beats or the basic unit of beats in grade five or grade six, they will get bored, so it should be taught according to the structures or concepts of beats, and the properties of beats."*

> *"One strand of the curriculum on PYP is instrumental playing. In the third year, we play the recorder. In the fourth year, it is angklung. In the fifth year, ukulele and angklung. In sixth year, ukulele."*

> *"Because I teach primary school students, I would like to use Kodaly as pedagogy. I would use the movement to clap or just feel the music movement. Also, I will make hand side Do Re Mi Fa and try to help them develop oral skills for singing."*

> *"For example, when they learn to play an instrument, they learn to appreciate music and think from different perspectives while composing."*

Generic Skills: Collaboration and Cooperation

As part of the generic skills development, collaboration and cooperation were emphasized and deserved the attention for training and development. To foster these skill sets, students should have adequate exposure to organization and group training. In primary schools, extracurricular activities or small projects were the strategies or preferrable platforms to empower students to work together to develop creativity through music performance or music appreciation, especially for senior primary school students. For the junior forms, they were engaged in music-related activities to learn socialization and develop stronger interpersonal and intrapersonal relationships with their classmates. The finding reflected that at the teacher level, all teachers had a mindset to push students to play or gamify music together, but at the school level, not all the schools were promoting it due to limited human capital and the hindrances of the pandemic.

> *"We have a choir, an orchestra, and a rock band. The choir is very popular, but the school only allows me to have 30 students."*

> *"Cooperative learning, because we always do a lot of activities that they need to be together. They need to be together, dance, or play games. I think that they need to be cooperative because if they don't cooperate, they will never learn and be in our lessons."*

> *"Playing in the orchestra is not just about playing instruments itself, they have to communicate and collaborate with the other students in the orchestra. I cannot tell and do an analysis that you have 10% better, but I can tell those students in the orchestra have better collaborative skills."*

"There are choirs in our school, but it is not very formal. It is not compulsory, meaning that if you want to join, you can join. There is a percussion class for them to learn percussion like marimba, and xylophone but thanks to COVID-19, there is no practice and contest this year."

Generic Skills: Technology-Supported Learning

The advancement of technology shed light on having more good practice of technology-supported learning during the pandemic situation. Facing the challenges of the change in the teaching environment, teachers could no longer educate vis-à-vis at schools but adapt to online teaching or online education. The attention spans of young children were around 12 minutes at the age of 6 years old and 30 minutes at the age of 12 years old (Brain Balance Achievement Centers, 2023). It was hardly asked primary school students to sit in front of digital monitors to learn music theory. The use of apps named Garage Band on iPads could allow students to improvise songs and enable a higher level of creativity in music creation and claimed to be effective.

"I think we were lucky because of the fifth wave in the second term. I have already taught them how to read the music, so they got the training in listening. Singing is really difficult in class because their singing is never synced together in the online teaching environment, thus I have to ask them to do that one by one."

"It [Covid-19] affects a lot. Our school orchestra has reduced the size and only the string session and percussion are left. We cannot practise in school. For those woodwind and brass sessions, we have to change it in Zoom. For regular school activities, like music lessons, let's say recorder teaching, we teach fingering inside the school and ask students to go back home to record the videos."

"For integrated learning, I always use an iPad with them. The project that I am doing with P4 students is that I get a video from cartoons like Disney. Then I mute the sound and they have to use the garage band app which is on the iPad. They have to compose the background music for that video."

"It is about how to use GarageBand on an iPad, like what elements in that software can be used."

Justification of the Framework: Common Training of Teachers

The social constructive music instructional framework had not yet been testified by the nature characteristics of the private international and aided public schools, but it was very generic instead of specific. Reflected by the interviews, these music teachers had gone through some but not the same Western music training. For instance, the common music educators they usually adopted were Kodaly, who was notable for singing and the solfege system, as well as Orff's approach and John Cage's. Others like Dalcrozes, Suzuki, and Gordon had not yet been mentioned.

"I'm using Kodaly because Kodaly is abstract before concrete. I would give the experiences first. By giving them all the experiences which let them feel everything before they go to conceptual learning, and then structural learning. If you are

following the Kodaly method to teach, you would follow the ta-ti-ti-ta. I will introduce how we are going to read the rhythm and listen. We then move on to reading, writing, and creating [music]."

"Because I teach primary school students, I would like to use Kodaly as pedagogy. I would use the movement to clap or just feel the music movement. Also, I will make hand side Do Re Mi Fa and try to help them develop oral skills for singing."

"Did you hear about Orff? It is a pedagogy that was invented by Orff."

"In composition, [let say] John Cage. He uses a lot of different sounds, but not precisely musical instruments. You can make a sound and he combined everything to make a piece of composition or piece of music."

Conclusion

This study not only aimed to reveal the teaching practices of music education in Hong Kong at the primary school level but also showed the characteristics of music teaching between private international and aided public schools. It was summed up in three dimensions: 1) Teaching foundation, 2) generic skills, and 3) common training of teachers. The teaching foundation was the same regardless of the different types of schools and all teachers took the initiative to be role models and gave intensive guidance to their students to learn how to sing, clap, and move, then catch the rhythms, tones, and beats, followed by the instrumental playing and song writing. The generic skills were cooperation and collaboration. Placing students in extra-curricular activities could leverage these skills in advance in which teachers reflected their performance in class. Lastly, technology-supported learning in music education was discussed, while the social constructive music framework did not include the technology element. Since it was coded based on traditional Western classical music instructional methods, this was considered a limitation of this framework in terms of comprehensiveness. In the 21st century, in no doubt that the existence of technology in learning needs to be addressed. The pedagogical content knowledge can be re-interpreted as technological pedagogical content knowledge (TPCK)(Angeli & Valanides, 2005; Koehler & Mishra, 2006), embedding the technology into music learning, such as the apps for music or song creation. It was of importance to investigate the technology development in music education to finetune the framework accordingly for future study purposes.

Appendix I

5 Music Instructional Methods & 19 Pedagogical Content Knowledge Nodes

Approach	Pedagogies	Activities	Procedures
Carl Orff	• Learn from playing • Learn with tools • Learn from singing • Learn gradually according to the developmental approach (E.g. Internalise the rhythm by learning the concept of rhythm first, then adding the body percussion)	• Imitate to build repertoire of pitches, rhythms, meter, tempo and dynamics • Hear movement of pitches, the content of rhythms, moment of meter and explore timbre of whatever instrument or voice • Develop musical framework • Analyze the musical material • Add music into drama/stories/tales	• Imitation • Exploration • Improvisation • Composition
Zoltan Kodaly	• Learn from singing • Learn gradually, and progress by adding one new note or rhythmic value at a time, from simple to complex • Learn from movement • Music should belong to everyone •	• Start with sight-reading and basic rhythms and pitches • Use self-developed teaching materials like folk music or songs to teach • Use solfege to teach sequence and incorporate rhythmic syllables	• Master sight singing • Sing along with the solfege system • Infuse walking, running and clapping while singing
Emile-Jacques Dalcroze	• Learn from rhythm, structure, musical expression and movement • Learn to be sensitive and expressive • Learn with purposeful movement, sound, thought, feeling and creativity • Learn in sequence • Combine movement	• Begin with ear training or solfege • Start with meter, dynamics, rhythms, tempo, duration, melody, form, phrase and pitch • Combine movement to learn solfege • Use improvisation to sharpen spontaneous reactions and physical responses to music	• Follow • Quick reaction • Interrupted Canon • Canon

Shinichi Suzuki	• Learn from sensitivity, discipline and endurance • Learn from training • Learn with encouragement • Learn in group • Learn as early as possible • Learn equally	• Start the ear development by repetition, followed by memorization for improving sensitivity of music and security in playing publicly • Play a repertoire in group	• Instrumental play • Deliberate practice
Edwin Gordon	• Naturally born with different music aptitude • Learn from interaction • Learn by guidance • Learn from sequence	• Experience music • Examine the tonal and rhythm patterns • Comprehend and understand music • Use solfege to assist students to recognize and audiate the characteristics patterns of each	• Acculturation (Aurally collect the sound, mimic, move and babble in response and attempt to relate with the environment) • Imitation (Recognise the movement and babbling, and imitate the tonal and rhythm patterns and other sounds) • Assimilation (Recognise the discrepancy and expected outcomes, and modify for better outcomes)

Highlights of Pedagogical Content Knowledge

1. Learn from playing
2. Learn with tools/instruments
3. Learn from singing
4. Learn music gradually and in sequence
5. Learn with body movement
6. Learn by modelling/guidance/training
7. Learn from interaction
8. Learn in supportive environment/with parent involvement
9. Learn from repertoire
10. Learn with solfege/ hand gestures
11. Learn as early as possible
12. Learn for morality/ discipline
13. Learn from structure
14. Learn from rhythm
15. Learn in group
16. Learn with purpose
17. Music is for all
18. Music is emotion expression
19. Naturally born with different music aptitudes

Appendix II

Interview Protocol

Personal Background
1. What is your educational background?
2. What is your degree major and minor?
3. Are you a holder of any teaching diploma? What is it?
4. Any other music-related certificates you are holding? (i.e. grade 8 piano, violin, vocal singing)
5. How long have you been teaching music curriculum?
6. What kinds of pedagogies you are using while teaching? Could you give some examples?
7. To what extent do you and other music teacher(s) follow the standard-driven approach, i.e., the music education curriculum suggested by the Curriculum Development Council (2003)?
8. What kinds of formative and summative assessments do you give to the students to develop the generic skills?
9. What is the type of your school? Government public school, aided public school, caput school, private school, private international school, and English schools' foundation?
10. Does your school adopt a small-class teaching approach? How many students are in one class?
11. How many music teacher(s) in your school?
12. How do you share the workloads with the music teacher(s)? Do you have any teaching assistants to support you?
13. Which primary levels you are responsible for?
14. How many music lessons per week in your school? How long is the music lesson?
15. In your school, what are the popular music activities? Is it outsourcing or led by you and the other music teacher(s)?
16. Does your school arrange concert visits or school performances each year? How many concert visits and performances happened inside/outside the school?
17. What kinds of rooms/venues you can use for musical activities, including teaching, and internal and external musical performances?
18. Do you think the facilities in your school are enough for training students to have instrumental/singing/brand/orchestra/other performances? If yes, may you give some examples? If not, kindly suggest what things can be improved.
19. What kinds of grants/ funding your school applied/received?
20. What are the major financial sources to support the musical activities in your school?
21. Are there any donations from parents, alumni, and other teachers?
22. What kinds of music-related activities you have to arrange for your school?
23. How often do you need to help and be involved in non-music-related activities? What kinds of duties do you usually need to perform?
24. Have you encountered any difficulties when teaching music during the pandemic situation? How do you tackle it and how the school support you? Interview
25. What kinds of technology and collaborative tools you have adopted for online music classes with students? What is the student's engagement level?
26. Are there any changes in assessments? What are they? Interview
27. Do you feel very stressed in the teaching arrangement when the pandemic alters the teaching practice? What kinds of activities have been disallowed and had a great influence on you and the students?

Appendix III

Table of Interviewed Music Teachers' Portfolios

Music Teacher A (MT01)	Music Teacher B (MT02)	Music Teacher C (MT03)	Music Teacher D (MT04)
Male	Female	Male	Male
Master of Music Education; USMCE Level 10 Piano; USMCE Level 5 Violin	Master of Music Education; ATCL Piano; Grade 8 Music Theory	Bachelor of Mathematics (minor in music); Grade 8 Piano; Grade 8 Music Theory	Master of Music Education Grade 8 Trumpet
>10 Years of Teaching	4-6 Years of Teaching	7-10 Years of Teaching	0-3 Years of Teaching
Private International School Experiential Learning; Inquiry Learning; Cooperative Learning	Private International School Inquiry Learning; Cooperative Learning; Experiential Learning	Aided Public School Experiential Learning; Assessment & Evaluation of Student Learning; Differentiated Instruction	Aided Public School Assessment & Evaluation of Student Learning; Open-ended Instructional; Integrated Learning
27 students per class; 40 mins; 2 lessons per week	25-27 students per class; 45 mins; 1 lesson per week	30 students per class; 30 mins; 2 lessons per week	30 students per class; 35 mins; 2 lessons per week
1 Full-time music teacher	1 Full-time (>20 classes); 1 part-time(8 classes)	5 Full-time music teachers	7 Full-time music teachers
P1;P2;P3;P4;P5;P6	P1; P2; P3;P4;P5;P6	P2;P3;P4;P5;P6	P1;P2;P3;P6
Have donations from parents, alumni and other teachers	Not much donations from parents, alumni and other teachers	Have donations from parents, alumni and other teachers	Have donations from parents, alumni and other teachers
Apply music resource in public/private sector	Apply music resource in public/private sector	Apply music resource in public/private sector	Not yet apply music resource in public/private sector

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Lexical Density in Academic Writing: Lexical Features and Learner Corpora Analysis in L2 Tertiary Students' Essays and Didactic Implications

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Abstract

Academic writing is crucial for communicating ideas among scientists, researchers and academics across various disciplines. It may be an arduous process for students when composing academic texts to meet the university requirements and academic discourse conventions. This research study investigates lexical features of the independent technical essays related to academic writing proficiency in students of Mechanical Engineering. Examining the score of lexical density compared to lexical diversity help educators understand the difficulties that students encounter when composing essays around topics concerning various technical study areas. Correlation between academic and specialty vocabulary in relation to lexical density was investigated to measure the extent to which the variables are related. Lexical density shows the measure of linguistic complexity of 42 university student essays. Based on statistical analysis, a moderate correlation exists between the measure of the academic vocabulary used by the students and the lexical density. A low negative correlation between specialty words and lexical density was found. Syntactic and structural features of the texts are also significant indices of the academic writing proficiency. Computational tools and corpora-based analysis were used for statistical analysis. Outcomes of the research helped identify the students' lexical needs within academic and content-based discourse in tertiary education and have didactic implications in L2 academic writing courses in compliance with the conventions applied in the university academic context.

Keywords: Academic Writing, Complexity, Density, Diversity, Proficiency, Queries

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1. Introduction

Writing is a process that encompasses skills and strategies related to text analysis, critical thinking, text editing, generating, argumentation, effective communication. Understanding subject-matter content assumes such a learning environment in which thinking skills are developed, and students are taught to think critically. Higher-order thinking skills help students make their studies more effective and meaningful. The framework of educational objectives developed by Benjamin Bloom in his taxonomy (1956) consists of six major categories: knowledge, comprehension, application, analysis, synthesis, and evaluation (Armstrong, 2010). Teachers and university instructors are supposed to develop the needed skills and abilities, help students encounter problems and grow their intellectual skills (King, 1997). There are many concepts of describing higher order thinking, but implementing good teaching strategies aimed at tasks demanding critical, logical, reflective, metacognitive, and creative thinking are crucial for students' ability to enhance academic writing proficiency (Rhashvinder K. A. Singh, Charanjit K. S. Singh, Tunku M. T. M., Nor A. Mostafa1 & Tarsem S. M. Singh, 2017). "Higher order thinking skills in teaching academic writing is a challenging task nowadays since learners are exposed to an enormous information influx" (Klimova, 2013; Whittington, 1995).

The language and content awareness development in university students is a major factor of better understanding oral and written texts. With focus on English for academic purposes (EAP), including English for specific purposes (ESP), a precondition for academic writing within the field of studying areas, synergistic use of language is considered. To improve academic writing skills, academic reading is a crucial factor in understanding and dealing with a writing task properly. Writing is a process that assumes gaining appropriate knowledge in a specific scientific area. Thereby, accompanied by developing academic reading strategies, like reviewing, scanning, skimming, questioning, visualizing, summarizing (Sunggingwati, 2017), help students to achieve higher confidence to produce proper paragraph structure within the text where cohesion and coherence are important features of academic writing. Other practical skills, like searching for appropriate literature sources, referencing academic literature, final summarizing arguments demand application of higher order skills, also related to sorting and identifying reliable information based on strong evidence.

Based on the research analysis, the attempt is to identify students' needs aimed at vocabulary learning strategies in ESP, in combination with academic writing. In this, some views of vocabulary learning in ESP are provided. The lexis in scholarly texts has been analyzed in many types of research where it usually distinguishes between core vocabulary, technical vocabulary and semi-technical vocabulary (Baker, 1988, Widdowson, 1993, Zamfir, 2022). Another classification refers to academic vocabulary used across all disciplines, and content, or content-specific, vocabulary. The term academic language is often referred to as general academic vocabulary, "all-purpose terms that appear across content areas" (Baumann and Graves, 2010). It is the kind of vocabulary "used in academic contexts regardless of which discipline you are specializing in" (McCarthy and O'Dell, 2016). It does not include the specialist vocabulary of a particular content or subject.

On the other hand, specialist vocabulary, also referred to as domain-specific academic vocabulary (Meneses et al., 2018), or technical vocabulary (Fisher and Frey, 2008), is very specific and appears in studying and scientific content area texts, coursebooks, scholarly texts and published articles. The frequency of domain-specific or technical words occurs less

frequently in comparison with the academic vocabulary. Communication between scientific communities means that professionals from different scientific, technological and industrial environments are expected to interact and use a high level of specialist communicative competence. It includes very specific terminology to identify, for example, various processes, hypotheses, names of tools, machines and components, mathematical symbols, equations and specialty terms, including trends and proportions expressed by charts, etc. To participate in cross-border exchange of knowledge, from teachers' and students' perspectives, learning objectives must be considered to provide significant input for foreign language acquisition. A genuine and authentic environment creates good conditions for international communication strategies development in higher education. Authentic texts are used in L2 language training for a higher density of specialist lexis that conveys a real message. The notion of authenticity implies a question about how students-readers engage with them and learn from them. Efficient learning strategies, task-based activities that increase motivation in students contribute to enhancement of the language so that a learner is able to reproduce the information the authentic texts convey.

1.1 Lexical Density and Lexical Diversity

Lexical density, as one of the dimensions of lexical complexity, refers to the proportion of content (lexical) words (nouns, verbs, adjectives, and adverbs) to all words (tokens) in the texts within a particular discourse; the proportion of content-carrying lexical words to noncontent-carrying grammatical words (Ure, 1971; Camicottoli, p. 73, 2007). It is also sometimes expressed as the ratio of the number of content words to the number of clauses (lexical density of a sentence) based as Halliday (pp. 61-72, 1985) proposed.

Various ways of measuring language complexity have been applied across studies. The concept of language complexity is associated with and can be measured at various levels (Lahmann, Steinkrauss, Schmid, p. 173 – 191, 2019), for instance, at the level of the words, phrases, sentences, or syntactic complexity (Kuiken, Vedder, 2019, Larsson, Kaatari, 2020). It has been measured as the L2 complexity of the production, and for this research purpose, the lexical diversity of university students' essays was measured. Lexical diversity is defined as the measure of how many different words, phrases or sentences appear in a text. In this research, the lexical diversity was calculated as the type-token ratio, i.e. the ratio of the number of different or unique words (types) and the total number of words (tokens) in essays.

2. Methods

In this paper, the main focus lies on investigation of academic writing proficiency through analysis of the students' essays. For the needs of this research, not full essay texts were analyzed, as the texts of approximately equal length were included for further statistical analysis.

Correlation between academic and specialty vocabulary in relation to lexical density was investigated to measure the extent to which the variables are related. Next relationship strength was analyzed between lexical diversity and lexical density quantitative variables. Lexical density and lexical diversity show the measure of linguistic complexity of 42 university students' abstracts as a part of the assignment in the L2 ESP course.

3. Results

The relationship between the values was investigated with the use of Pearson's correlation. Whether the sample comes from a normal distribution, the values of the standardized skewness and standardized kurtosis were checked (Table 1). The values are not outside the range of -2 to +2, thus indicating that the statistical procedures can be normally applied to this data.

	Academic words	Specialist words	Lexical density
Count	42	42	42
Average	7,96119	10,9814	56,8333
Standard deviation	3,74925	4,60334	4,82835
Coeff. of variation	47,0941%	41,9193%	8,49564%
Minimum	2,48	1,92	46,0
Maximum	15,65	22,92	69,0
Range	13,17	21,0	23,0
Stnd. skewness	1,04472	1,93882	0,810887
Stnd. kurtosis	-1,18827	0,389734	0,156742

Table 1: Summary statistics

Based on statistical analysis, a moderate positive correlation exists between the measure of the *academic vocabulary* used by the students and the *lexical density*. Table 2 shows Pearson product moment correlations between each pair of variables. The correlation coefficients range between -1 and +1 and measure the strength of the linear relationship between the variables. The number of data values used to compute each coefficient are shown in parentheses. The third number in each location of the table is a P-value. It tests the statistical significance of the estimated correlations. P-values below 0.05 indicate statistically significant non-zero correlations at the 95.0% confidence level. The following pairs of variables have P-values below 0.05: *academic vocabulary* and *lexical density*. A low positive correlation between *specialty words* and *lexical density* was found (Table 2).

	Academic vocabulary	Lexical density	Lexical diversity	Specialty vocabulary
Academic vocabulary		0,5332	0,1375	-0,1794
		(42)	(42)	(42)
		0,0003	0,3853	0,2556
Lexical density	0,5332		0,3431	0,2789
	(42)		(42)	(42)
	0,0003		0,0261	0,0736
Lexical diversity	0,1375	0,3431		-0,1718
	(42)	(42)		(42)
	0,3853	0,0261		0,2765
Specialty vocabulary	-0,1794	0,2789	-0,1718	
	(42)	(42)	(42)	
	0,2556	0,0736	0,2765	

Table 2: Pearson product moment correlations between each pair of variables

Visualization of the Pearson correlation coefficient can also be seen in Fig. 1, which displays how close the points are falling to the line of best fit. Based on the slope of the line of best fit, the Pearson correlation coefficient is either positive (above-mentioned correlation coefficient between the academic vocabulary and the lexical density) or negative (above-mentioned correlation coefficient between specialty words and lexical density).
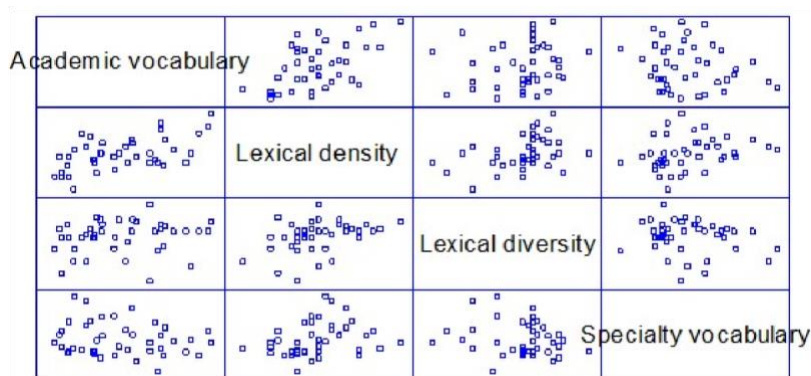
Figure 1: Visualization of the Pearson correlation coefficient

A moderate positive correlation exists between the values of *lexical density* and *lexical diversity* as can be seen in Table 3, where the Pearson correlation coefficient is between 0.3 and 0.5 indicating moderate strength and positive direction. The P-value is below 0.05 and thus considered statistically significant.

	Lexical diversity	Lexical density
Lexical diversity		0,3431
		(42)
		0,0261
Lexical density	0,3431	
	(42)	
	0,0261	

Table 3: Correlation between the values of lexical density and lexical diversity

Figures 2 and 3 refer to histograms for lexical diversity and lexical density variables frequency distribution. Summary statistics is displayed in Table 4.
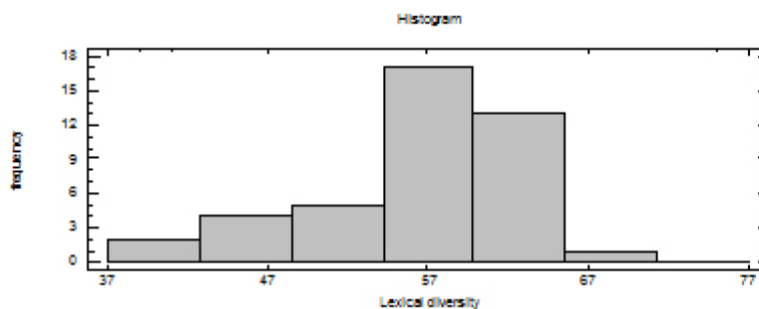
Figure 2: Histogram for lexical diversity
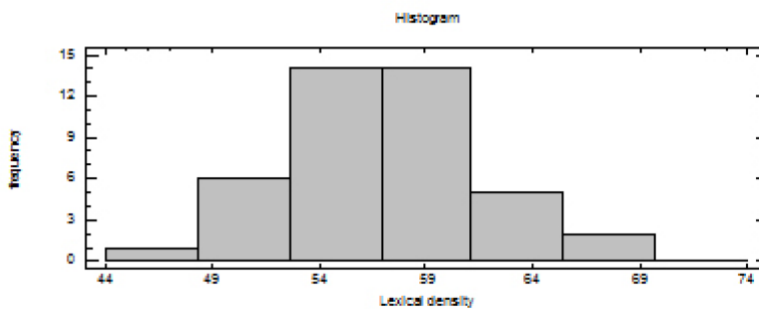
Figure 3: Histogram for lexical density

	Lexical diversity	Lexical density
Count	42	42
Average	56,9048	56,8333
Median	58,5	56,5
Standard deviation	6,48379	4,82835
Minimum	39,0	46,0
Maximum	70,0	69,0
Range	31,0	23,0
Stnd. skewness	-2,3261	0,810887
Stnd. kurtosis	1,02987	0,156742

Table 4: Summary statistics

A weak negative correlation, statistically insignificant (P-value is higher than 0.05), exists between the values of academic and specialty vocabulary (Fig. 4).
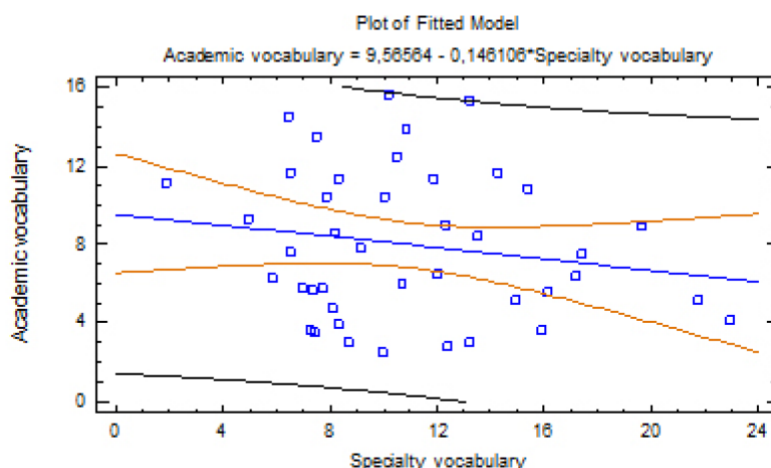
Figure 4: Relationship between academic and specialty vocabulary

Figure 5 displays the relationship between the values of specialty vocabulary and lexical density. A low positive correlation, statistically insignificant (P-value is higher than 0.05), exists between the values.
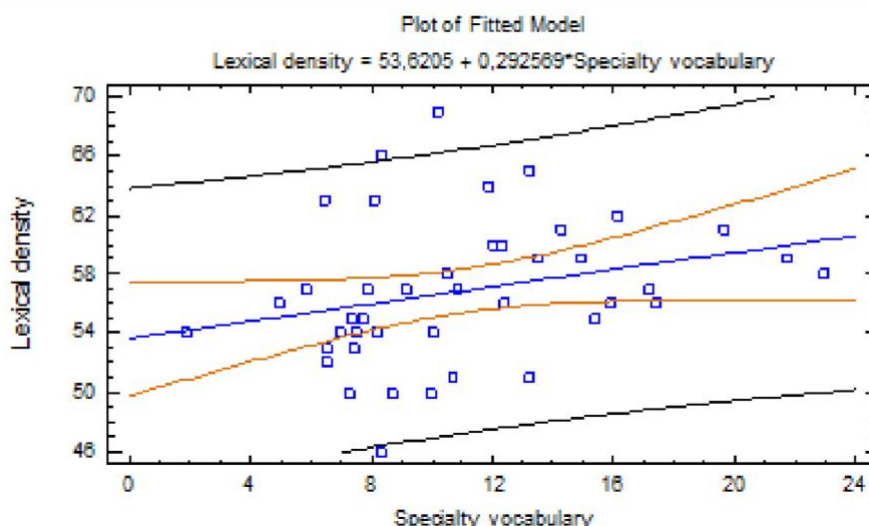
Figure 5: Relationship between the lexical density and specialty vocabulary

As can be seen in Fig. 5 displayed above, a moderate positive correlation, statistically significant (P-value is lower than 0.05), is between the values of specialty vocabulary and lexical density. As regards the relationship between specialty vocabulary and lexical diversity, a weak negative correlation, statistically insignificant (P-value is higher than 0.05), can be seen in Fig. 1.

3.1 Learner Corpus Analysis

The extent to which particular lexical features are used by students, and how they correlate, has been analyzed with the use of Pearson's correlation.

The Sketch Engine corpus tool provides the data source for investigating the language use. For the purpose of the research, the learner corpus in mechanical engineering compiled from the students' essay abstracts, was applied. Word frequency counting, concordances, keywords, collocation analysis and automatically extracted grammatical relations based on statistical patterns in the corpus enable discourse analysis, thus providing an overview of language variation in students' academic writing. The general info about the corpus of 42 students' essays used in the research is provided in Table 5.

Tokens	7,991
Words	7,104
Sentences	399

Table 5: The total numbers of tokens, words and sentences are shown in the general info.

Some of the outcomes from the Sketch Engine tool are displayed in the following figures. For instance, the Word Sketch function was used to identify multiword collocations with the word "transmission", which stands on the 14th position of the wordlist based on how frequently the words occur in the corpus. Sample modifiers of the word used by the students are:

> **10-speed automatic** transmission
> **Hydraulic automatic** transmission
> **Dual-clutch** transmission
> **3-speed manual** transmission

Verbs used with "engine" as an object, the second most frequent word in the corpus, can be extracted:

> … type of vehicles that **combines** *an internal combustion engine …*
> *… they also **introduced** new engines from…*
> *… used to **power** the engine …*

The N-Grams function enables extracting the sequences of a particular number of items how they were mostly used by students. For example, the following most often 3-item sequences of words occurred:

> **Of the car**: *…can fully rely on the capabilities **of the car** on the roads …. ; … in the second last generation **of the car**.*
>
> **Internal combustion engine:** *… a type of vehicle that combines an **internal combustion engine** with … ; Heat is the product of the **internal combustion engine**.*
>
> **Zero energy house:** *In short we can say that the **zero energy house** produces… ; … equality between consumed energy and energy produced by **zero energy house**.*

Connection between patterns and meaning, as the examples mentioned above indicate, enables students to understand a particular technical term as part of a phrase rather than in isolation, thus leading to better understanding of authentic materials. "From this perspective, the lexical approach lies in teaching collocations, i.e. how lexical items co-occur and what grammar they tend to be associated with. In addition, knowledge of collocations supports effective sentence producing and enhances L2 proficiency development in students" (Lipková, 2021).

4. Conclusion

Concerning the moderate positive and statisticacally significant *(P-value is lower than 0.05)* correlation between the values of academic vocabulary and lexical density, it can be seen that with increased lexical density also more academic words are used by students in their written texts, and more frequently, compared to specialty words. Relationship exists between the variables and we can reject the null hypothesis.

With increased lexical density also more academic words are used by the students in their written texts, and more frequently, compared to specialty words. A relationship (moderate positive correlation, P-value is lower than 0.05) exists between the variables and we can reject the null hypothesis.

With increased lexical density also more specialty words are used by the students in their written texts, though very little (low positive correlation; statistically insignificant, P-value is higher than 0.05). We cannot conclude that the independent variable affects the dependent variable (if lexical density affects specialty vocabulary).

With increased density also lexical diversity, i.e. richness of vocabulary increases. Relationship exists between the variables (moderate positive correlation; statistically significant, P-value is lower than 0.05) and we can reject the null hypothesis.

If the number of the used academic vocabulary increases, it does not mean that specialty vocabulary word number increases too as a weak negative and statistically insignificant (Pvalue is higher than 0.05) correlation exists between the variables. We cannot conclude that the independent variable affects the dependent variable (if academic vocabulary affects specialty vocabulary).

If lexical diversity (richness) increases, there is still an insufficient number of specialty words used by students, based on the weak negative, statistically insignificant (P-value is higher than 0.05) correlation. We cannot conclude that the independent variable affects the dependent variable (if lexical diversity affects specialty vocabulary). As a result, teaching strategies aimed at developing specialist content-based terminology must be applied.

Currently, it is worth mentioning that a diverse approach to increasing the needed vocabulary considering the terminology used in translated texts has been investigated. Text complexity, including syntactic complexity (Vanmassenhove, Shterionov, Way, 2019), has been observed across research into comparison of machine translation, post-edited machine translation and human translation with special attention to lexical diversity, error rates and differences between the reference human translation and the machine translation, also with respect to their communicative function (Hudecová et al., 2021). Development of writing in a second language is a complex process and demands further expertise with respect to L2 learners' proficiency, including the ability to compose the texts. Studies examining learners' decision-making process when composing their texts followed by translating the texts into L2 have been surveyed to enhance text production skills in a second language (Jahangard, Holderread, 2017), as well as with the use of parallel corpora-based translation where, based on comparison of English texts and their corresponding translations, students studied lexical features and syntactical structures to be able to do back-translations from L1 to L2, thus becoming familiar with discourse patterns (Cappuzzo, 2020).

Corpus Query System (CQS) enables teachers, students, translators and other users to work with large amounts of texts according to their needs and objectives. From this perspective, computational linguistics and corpora-based teaching of L2 might be thought as an effective solution for teachers in their effort of designing study materials that meet teaching/learning objectives and learners' needs. This can be used to facilitate designing ESP lessons for professionals. Language structures and phrases typical for various text registers, or types of discourse, allow us to answer great number of research questions and hypotheses, or verify our intuition about the language. The relationship between vocabulary and the quality of written texts was examined in the research based on the lexical features analysis. The use of multi-word collocations is one of the indicators of the sophistication and complexity of the written compositions, along with vocabulary density and diversity lexical indicators.

Acknowledgements

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An Initial Study of Integrating Bilingual and Science Instructional Modules for Elementary Science Teacher Preparation

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Abstract

The study aimed to develop integrated English and Mandarin instructional modules for elementary science teacher preparation. The instructor played a researcher's role in implementing action research during science teaching and learning. Fifty university elementary pre-service students taking the three-semester hour course during the two semesters participated in the study. The researcher developed the multi-models of multimodalities, consulted with five science education experts, and modified them to apply in the science teaching and learning course. They were integrating English and science concepts to guide the pre-service students to learn by doing inquiry-based science activities, such as identifying plant characteristics, insect taxonomy, and a variety of science experiments.Data were collected from classroom observation, questionnaires, student assignments, and feedback; most pre-service students put their hearts into operating science activities and expressed their thoughts in bilingual ways through the integrated instructional modules. Some pre-service students wrote interesting poems and science stories and developed lesson plans across several disciplines, including science, Mandarin, English, art, and mathematics. On the other hand, some pre-service students needed help with science concepts and theories in English. Multimodality was effective in engaging their understanding of learning science. Two-thirds of pre-service students were interested in designing science activities in English. However, they needed to be more self-confident in expressing themselves in bilingual ways. Learning confidence needed to be enhanced to engage the elementary pre-service students using English as the medium of instruction, content, and language-integrated learning skills.

Keywords: Bilingual, Multimodality, Pre-service Students

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Introduction

The new national education curriculum for the 12th year emphasizes that the English curriculum in national primary and secondary schools aims to develop students' abilities and habits in independent learning and lifelong learning of English. English learning should also follow the era of globalization and go beyond the framework of classrooms and textbooks so that English learning can be continuous. English is no longer just a language in school but can be learned from everything in life. English learning can also continue understanding the broader world by expanding life experience. Meanwhile, culture and nation enhance the ability of international participation and cultivate a global outlook for the learners.

In conjunction with the "2030 Bilingual National Policy Development Blueprint" announced by the National Development Council today, the Taiwanese Ministry of Education will aim to "comprehensively launch the bilingual activation of the education system and cultivate Taiwan's bilingual talents for the world" by accelerating teaching and learning activation. There are five significant strategies include adapting to daily life, expanding English human resources, making good use of technology to popularize individualized learning, promoting the internationalization of the education system, and relaxing regulations and establishing flexible mechanisms to strengthen students' ability to apply English in life and their future competitiveness in the workplace, and through joint efforts with various ministries.

To meet the goal of the "Blueprint for Developing Taiwan into a Bilingual Nation by 2030", it is essential to nurture pre-service students' capabilities in bilingual science activity design and to enhance their self-efficacies in bilingual science teaching. Therefore, examining the pre-service students' capabilities and self-efficacy is crucial to developing integrated English and Mandarin instructional modules for elementary science teacher preparation. Two research questions raised to guide this study were listed as the following.

1. How did the pre-service students perform their self-efficacies in bilingual science teaching?
2. How did the pre-service students exhibit their capabilities in bilingual science activity design?

Literature Review

Content and language integrated learning (CLIL) is not only language courses but also includes courses that focus on one subject and combine language learning. According to the 4C Principles proposed by Coyle (1999), successful curriculum implementation must consider four main aspects: content, communication, cognition, and culture, and design curriculum and teaching content per national conditions and cultural characteristics. CLIL practices are initially from Europe and are widely applied in European schools (Eurydice, 2017). Nowadays, CLIL practices are applied globally. To achieve the bilingual national education policy, a content, and language integrating learning approach is also used in bilingual classroom teaching in Taiwan. Content and language integrating learning (CLIL) encompasses subject knowledge and concepts, cognitive skills, and academic language needed to understand and illustrate subject knowledge (Lo & Lin, 2019). Students can learn both subject knowledge and language knowledge in the classroom at the same time through the CLIL approach.

Rabbidge (2019) indicated five translanguaging strategies enhance teacher-student interaction and English learning outcomes, including instructional, vocabulary-discovery, concept-checking, associative, and affective translanguaging strategies. Translanguaging is like cross-linguistic practice and is derived from both multiliteracy and multimodality. It comes from the concept that emphasizes the variability in language practice. When we use language, we usually combine languages and multiple media, such as gestures, text, images, and symbols, to construct meaning. The strategies of translanguaging can help students overcome language learning barriers and gain a deeper understanding of subject knowledge. The concept of multimodality is that meaning-making does not occur through language but rather through the multiplicity of modes (Kress, 2010). Content knowledge combined with multimodal teaching design makes content learning more enjoyable.

Meanwhile, students can understand subject concepts and principles directly while overcoming language barriers through multimodality. Graphic resources like charts, diagrams, and graphs are used in science. Science teaching and learning usually occur through multiple modes (Liu & Lin, 2021).

Methods

In two semesters, the instructor played the researcher's role in implementing action research during science teaching and learning. Fifty university elementary pre-service students took the three-semester hour course during the two semesters. Twenty-four pre-service and twenty-six pre-service students participated in the study during the first and second semesters. The researcher developed the instructional modules with multimodal approaches, consulted with five science education experts, and modified them to apply in science teaching and learning within two semesters. When pre-students have difficulty understanding concepts and principles, the approaches of translanguaging and multimodality were applied to engage students' learning understanding and effectiveness, such as pictures, videos, and teaching aids.

Both quantitative and qualitative methods were applied in this study. Triangulation was achieved by collecting data from questionnaires, classroom observation, pre-service students' assignments, and feedback. Five science researchers designed and validated the self-efficacy questionnaire of pre-service students concerning bilingual science teaching and learning. The meaning-making of science concepts and theories for the pre-service students was taught in the class. Bilingual instructional models emphasizing scientific inquiry were used in science teaching and learning. Science activities as the approach of instructional translanguaging. For instance, identify plant characteristics, insect taxonomy, and a variety of science experiments. The instructor integrated English and science concepts to guide the pre-service students to learn by doing inquiry-based science activities. The multimodalities, translanguaging, content, and language-integrated learning approaches were applied in science instruction. The pre-service students' capabilities were encouraged to present in bilingual science activity design.

Findings

By introducing basic English and books or media, almost all students can understand the content taught in this course. During the first semester, picture and word cards were used for bilingual science teaching and learning. Twenty-six pre-service students participated in the second semester; many multimodalities were applied in the course, such as science reading

and writing of picture books, picture cards, word cards, and board games. The above methods were used in the class. Multimodalities were effective in engaging their understanding of science learning. Most of the pre-service students feel interested in bilingual learning ways. However, some pre-service students needed help learning science concepts and theories in English. Data on the self-efficacy of pre-service students during the first semester and the second semester were collected from the questionnaires. For instance, they are interested in the application of listening, speaking, reading, and writing in English (52.8%; 43.9%). Like the course delivered in an English-speaking way (59.5%; 58.5%). They are interested in elementary science teaching using English as a bilingual method (66%; 63%). They are confident in incorporating English into elementary science teaching (39.6; 29.2%).

According to the data from the questionnaires on the self-efficacy of pre-service students in the 2nd semester, there were similar results in the first semester. The findings showed that the performance of pre-service students still has a long way to go. For instance, 48.8% of pre-service students understand and use translanguaging strategies in bilingual science teaching. The 43.9% know and use multimodalities to implement bilingual science teaching. The 48.8% of them understand and use CLIL strategies for bilingual sciences teaching. 53.6% of them understand and use question guidance strategies to teach sciences through English question-led discussions. Approximately sixty percent of pre-service students agreed with the course instruction and liked the course taught in English. Roughly fifty percent of pre-service students understand the approaches of translanguaging, multimodalities, and CLIL. Two-thirds of pre-service students were interested in designing science activities in English; however, they needed to be more self-confident in teaching in bilingual ways. Therefore, English proficiency for all the pre-service students must be enhanced step by step.

The English training in listening, speaking, reading, and writing was emphasized throughout the study. Forty percent of pre-students taking the course can answer various questions correctly in English, and other learners are studying hard. Nearly forty percent of the students taking the course can respond to course questions in English. They looked very hard, thought and discussed in English, and tried to respond to the teacher's questions in English. More than 90% of students can read and understand the English books and articles related to this course. More than 90% of students can read and understand professional vocabulary in science and teaching in English. Eighty-five percent of students can correctly answer worksheets and test questions and report writing assignments in English. Forty percent of students can write about the design and evaluation of scientific activities in English. Data were collected from classroom observation, pre-service students' assignments, and feedback. Most pre-service students put their hearts into operating science activities and express their thoughts in bilingual ways through integrated instructional modules. Some of the pre-service students wrote interesting poems and science stories. They developed science lesson plans across several disciplines, including science, Mandarin, English, art, and mathematics, such as bilingual STEAM instructional modules. Exciting stories were written by the pre-service students as follows.

Example 1:
Time Passing--
The banyan tree is so big and full of leaves; who knows how many years it has accumulated. His thick hands keep me cool whenever I walk under the banyan tree in the hot summer.

Example 2:

A traveling Frog in a Rainy Day--

I am a frog who likes to travel, and I like rainy days, too. It's raining today, so a lot of creatures came out. Butterflies, bees, and ants are my friends. They gave me many gifts.

This study was conducted during the preliminary implementation of bilingual teaching in Taiwan. All pre-service students worked hard to present imaginative works. Although they adapted to bilingual teaching and learning, the acceptance rate in all aspects is about 60%. However, pre-service students' acceptance of incorporating English into learning science has already exceeded 60% and is increasing day by day. The process and model of exploring cross-language and cross-semiotic practices as a scaffolding for classroom teaching in bilingual classrooms are helpful for students' English learning. This study focused on science teaching and learning for Taiwanese pre-service students and also obtained similar results as Liu did (Liu, 2020). Taking the English comprehensive humanities class of a junior high school in Hong Kong as an example, Liu (2020) collected and analyzed videos of teacher-student interactions in the classroom and students' after-class exercises to study teachers and students' cross-lingual and cross-symbol practice of expressing expressions, and proposed that these real-time spontaneous phenomena are called cross-lingualism. Inter- and trans-semiotic practices can support planned and systematic scaffolding (Liu, 2020).

Some pre-service students said they needed to improve at explaining scientific terms and specific subject knowledge in English. Therefore, more training in specific-subject knowledge is needed for the pre-service students. Kim and Graham (2022) stated that CllL teachers responded that they must take more training in developing specific-subject knowledge from the analysis of related research. Meanwhile, time-constraint is also a big challenge to deliver content in bilingual teaching. The problems that pre-service students encountered are the same as Massler (2012) found many teachers reported time constraints as a problem and found it influenced instruction owing to their heavy workload.

Conclusion

Pre-service students performed well in science activity design, emphasizing scientific inquiry. The motivation and interest of the pre-service students concerning bilingual science teaching and learning were successfully nurtured in the two semesters. Pre-service students' self-efficacy and confidence need to be gradually enhanced in bilingual science teaching, especially in interpreting science concepts and expressing skills in English. Scaffolding is essential for the learners to cross their learning zones of proximal development in bilingual science teaching and learning. Even though pre-service students are facing the challenge of implementing bilingual teaching and learning in Taiwan, most of them are optimistic and willing to make efforts to go for it. To engage the elementary pre-service students using English as the medium of instruction, content and language-integrated learning skills and learning confidence must be enhanced. Implementing bilingual instructional design is a good approach for nurturing the pre-service students' capabilities in science activity design and English proficiency. It is helpful to create a supportive learning environment for pre-service students to engage them in bilingual science teaching and learning.

Acknowledgments

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Images As Catalysts: A Pedagogical Exercise Enhancing Writing Skills for First-Year PhD Design Students at the University of Porto

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Abstract

This paper introduces a pedagogical exercise that employs images as catalysts to facilitate the writing process for first-year PhD Design students at the University of Porto. The exercise pursues two fundamental objectives: firstly, to aid students in refining their research scope into a manageable territory, and secondly, to empower them to articulate the boundaries and intersections of their research, ultimately kickstarting their writing endeavours. The study has been carried out in the context of classes comprising approximately ten students who were applying design methodologies to address problems beyond the traditional design realm, encompassing areas such as medical equipment and communication design. These students were in their first year and engaged in the discipline of Research Methodologies; this exercise served as a valuable tool to enhance their writing abilities. The exercise's significance arises from the acknowledged challenge design students encounter when attempting to articulate their thoughts in writing. Their cognitive processes are inherently visual, and they often interact with knowledge primarily through images. In the context of writing a PhD thesis, where proficient writing skills are a prerequisite, these images serve as catalysts and gateways to the writing process. The study employed a comprehensive methodology that involved retrospective observation, visual analysis, and interviews with the participating students. The anticipated outcome of this research is the development of a model for effectively conducting this pedagogical exercise, with the intention of aiding future design students in honing their writing skills by leveraging visual analysis as a valuable tool.

Keywords: Design Research, Visual Analysis, Phd Pedagogical Exercises

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Introduction

This article describes and analyses a pedagogical model of exercises conducted with doctoral design students enrolled in the PhD in Design program at the University of Porto (UP). The primary objective of this exercise was to stimulate and enhance the writing skills of these students, a task that has often posed challenges for them.

The significance of this exercise is rooted in the recognised difficulty that design students face when attempting to articulate their thoughts in writing. Design students typically engage with cognitive processes that are inherently visual (Ibrahim, 2020), relying on images as their primary mode of interacting with knowledge. In the context of pursuing a PhD in Design, where proficient writing skills are essential, these visual stimuli serve as catalysts and gateways to the writing process.

Fig. 1. Workshop of Visual Methods at the Faculty of Fine Arts, University of Porto, October 2022. Source: author, 2022.

The Problem

The field of design research poses challenges, especially in transitioning from visual ideation to articulate written expression. Visual analysis workshops contribute to the broader discourse on effectively integrating visual methodologies in design research, challenging the prevailing practice of individual research (Noble, 2005). In these workshops, students lend their thinking to a each others' projects.

The exercise serves as a transformative tool, acknowledging and leveraging the inherently visual cognitive processes of design students. It gives them a gateway to proficient writing skills essential for pursuing a PhD in Design. Design students navigate the complexities of form, function, and aesthetics through visual representations. However, when translating these thoughts into written language, they may encounter difficulties. This exercise recognises and addresses this challenge by acknowledging the cognitive processes of design students and creating a bridge between visual thinking and written expression.

Fig. 2. Workshop of Visual Methods at the Faculty of Fine Arts, University of Porto, October 2022. Source: author, 2022.

A comprehensive and articulate written discourse is essential for presenting research findings, communicating complex design concepts, and contributing meaningfully to the academic discourse. However, the conventional methods of teaching writing skills may not align seamlessly with the cognitive processes of design students, leading to a gap in their ability to express their ideas effectively. Whether sketching ideas, creating mood boards, or developing prototypes, the visual language, visual quotes (Esser, 2012), is central to their creative process.

The exercise encourages students to construct a visual atlas—a dynamic representation of their research interests through images following Aby Warburg's Atlas Mnémosyne. This visual atlas allows for the intuitive arrangement of images, creating a personalised and evolving visual narrative.
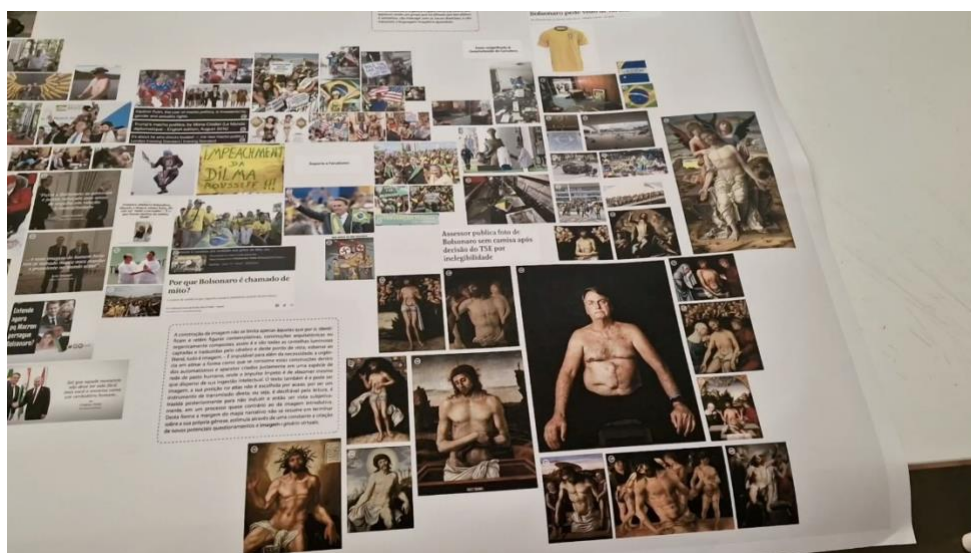
Fig. 3. Atlas presentation by Guilherme Oliveira at the Faculty of Fine Arts, University of Porto. Source: author, 2023.

The Atlas Mnémosyne, created by the German art historian Aby Warburg (1866-1929), or as he liked to be called, "image or picture historian" (Russell, 2007) can be viewed as a significant intellectual and methodological upheaval, not confined solely to the field of art

history but extending its impact across diverse disciplines dealing with images in various capacities. Serving as a "visual form of knowledge," the Mnemosyne Atlas introduces a novel epistemic paradigm, concurrently unveiling a fresh aesthetic paradigm of visual expression. This paradigm shift, evident since the mid-20th century, has led to the gradual dissolution of previously distinct practices and discourses, fostering collaboration among historians, curators, theorists, and artists within a shared realm of activity.

Comprising over 1000 images distributed across 63 plates, the Mnemosyne Atlas initially presents itself as an "inventory of traces of Antiquity" that influenced the Renaissance's style of representing dynamic life, according to the author's introduction. Notably, the images span from Mesopotamia in the 17th century BC to regions around the Mediterranean, extending to Northern Europe and the 19th-century era of Manet. As a form of knowledge stimulating the imagination and embracing multiplicity, disparity, diversity, and proliferation, the Atlas invites a Baudelairian sense of "flânerie"—an exploration and wandering.

The exercise's significance lies not only in acknowledging the cognitive preferences of design students but also in fostering a holistic approach to education. It recognises that effective communication in the field of design goes beyond traditional written forms and encompasses a visual language that is inherent to the discipline. Additionally, the exercise aligns with the evolving nature of design research, where interdisciplinary approaches and diverse methods are increasingly valued. By incorporating visual analysis as a valuable tool in developing writing skills, the exercise prepares design students to navigate the complexities of contemporary design research that often transcend traditional disciplinary boundaries.

Context

The author has been actively engaged in teaching at the Doctoral Programme in Design at UP since 2012 (PhDDesign, 2024). Throughout this period, the pedagogical exercise has been consistently implemented, incorporating minor adjustments based on valuable student feedback.

The student cohort typically ranges from eight to ten individuals, representing diverse nationalities and distinct educational backgrounds. Initially, the exercise centred around selecting five research images, requiring students to justify their choices and elucidate the synergies between them during a 10-minute presentation. The students would then physically display their image boards on the wall, using them as a focal point for their presentations.

The inclusion of students from diverse academic backgrounds, including Economics, Design, Fine Arts, and Sociology, enhances the external validity of the study. This diversity allows for a broader range of perspectives and insights during the exercise.

Deconstructing chosen images in both an intuitive and systematic manner suggests an iterative process. This iterative approach allows for flexibility and adaptation, ensuring that the analytical process evolves based on initial findings and feedback.

The emphasis on stimulating critical thinking by analysing composition, subject matter, and potential meanings in photos suggests a targeted approach to developing analytical skills. This improvement focuses on specific aspects of critical thinking and visual analysis.

Including a step where students compare different photos to identify patterns, similarities, and differences enhances the depth of the analysis. This comparative approach adds a layer of complexity to the exercise, leading to a more comprehensive understanding of visual elements and themes.

Students experimenting with various techniques, such as converting photos to black and white, altering framing angles, and adjusting sizes, showcase a creative and exploratory aspect of the exercise. This experimentation contributes to a more nuanced analysis and interpretation of the images.

Fig. 4. Display of students' image boards on the PhD in Design studio walls
in December 2021. Source: author, 2021.

These poster presentations emerged as valuable resources for subsequent lecturers teaching other modules. It became a common practice at the beginning of each module for lecturers to inquire about the students' research interests, and the visual context provided by these posters facilitated a comprehensive understanding of the students' ongoing research endeavours.

The exercise has significantly transformed in the last twelve years, expanding into a more extensive initiative—a visual atlas inspired by Aby Warburg's Atlas Mnemosyne. Students are encouraged to construct a visual atlas, incorporating multiple images directly related to their research interests. The arrangement of these images on a metaphorical "wall" is left to the students' intuitive perception.

Various typologies emerge, with some opting for a left-to-right progression, others creating clusters of related topics, and some aligning their visual atlas either vertically or horizontally. The final shape is not prescribed by any specific rules; however, a consensus exists that there is no limitation on the number of images. Students can continually add and refine their atlas, employing editing procedures such as zooming in, cutting out, and other adjustments. As opposed to text editing, images are built in this atlas to the point of saturation of data.

Methodology

The methodology employed in this study is inherently qualitative, encompassing retrospective observation, visual analysis, and interviews with the participating students.

a) Retrospective observation spans a twelve-year period, reflecting on the evolution of the exercise and its current form. This involves examining the walls with images, recalling past conversations, and incorporating observations from colleagues. The outcome of the exercise, as well as the progress of the research, played a pivotal role in shaping its current structure.

b) The visual analysis comprises a thorough examination of the students' walls and the outcomes of their individual research endeavours. This analytical process materialised during their presentations, wherein they not only explored the existing synergies but also identified new connections. The group engaged in a form of photo elicitation analysis, actively participating in each other's visual analyses.

c) Interviews were conducted with participating students, some taking place during the exercise, while others occurred years after the course had concluded. Their feedback provides insights into their attitudes towards the study and the nature of their research.

The convergence of retrospective observation, visual analysis, and interviews in this research has yielded a comprehensive understanding of the exercise's evolution, its current structure, and the impact it has had on the participants. This methodological interweaving not only captures the multifaceted nature of the study but also contributes to a nuanced and holistic interpretation of the findings.

Work Sessions

The work sessions took place in the UPTEC baixa, a structure for supporting knowledge transfer between the University and the market. It fosters the creation of technological, scientific and creativity-based companies, enabling relationships between Portuguese and international innovation centres. We work at the PhD Design studio, and the first stage of the process is to identify gaps of knowledge that need to be addressed in this exercise, for example, how to create a working definition for an evolving thesis. How do we create categories of concepts? Based on these gaps, we first look at the theoretical framework of the problem and identify the actions that need to be taken to conduct the workshop.

Fig. 5, 6. UPTEC building premises and work session at the PhD em Design studio.
Source: author, 2021.

We target one session per student, which means that one student has the participation of his colleagues in a case study methodology. We would have the whole class brainstorming and actively engaged in the building of knowledge through visual analysis. Each student was allocated one session of three hours, but some students were allowed to extend it to two sessions.

The group is gender-balanced, and students range from 25 to 52 years old.

The exercise comprised various phases contingent upon the chosen topic. The initial phase involved image selection, during which students were encouraged to respond intuitively to the images, with guidance such as "Include it if you perceive a connection" and "When in doubt, include it!" Furthermore, students were advised that, in the realm of images, abundance was preferred over restraint, and there was no need for economic considerations. I occasionally emphasised that, unlike our inclination to render text intelligible and cohesive, the creation of the atlas did not impose any form of censorship; it served as a preliminary stage. Subsequently, we could engage in zooming in, generating additional sub-atlases, or editing fragments of the existing one. In essence, the process allowed for freedom of choice.

Fig. 7. Scattered images before visual analysis work session at the PhD em Design studio.
Source: author, 2022.

Data Analysis and Interpretation

The data analysis and interpretation of the pedagogical exercise involving images as catalysts for first-year PhD Design students at the University of Porto reveal rich insights into the evolution, impact, and significance of this innovative approach to enhancing writing skills.

The retrospective observation spanning twelve years provides a comprehensive understanding of how the exercise has evolved. Examining the walls adorned with images, recalling past conversations, and incorporating colleague feedback contribute to a nuanced picture of the transformation. This analysis highlights the shift from individual poster presentations to the more dynamic and flexible visual atlas format inspired by Aby Warburg's Atlas Mnemosyne. The evolution is not merely structural but reflects a deepening engagement with the cognitive.

Fig. 8. Work session of visual analysis with MA students at the Faculty of Fine Arts, University of Porto. Source: author, 2022.

The interviews conducted with participating students provide valuable insights into the impact of the exercise on their writing skills. Students acknowledge the inherent challenge of articulating their thoughts in writing and express how the visual stimuli provided by the exercise serve as catalysts and gateways to the writing process.

The exercise not only addresses the unique challenges faced by design students in expressing their thoughts in writing but also contributes to a collaborative and innovative learning environment. The individualised typologies of visual atlases, coupled with the positive impact on writing skills, position this pedagogical exercise as a valuable model for future design students seeking to hone their writing abilities.

Fig. 9, 10. Image Atlas and Legend/description by Tulio Filho, MA in Image Design, 2023. Source: Author, 2023.

Case Study: Two Workshops

Two visual analysis workshops held with doctoral students in the Design program at the University of Porto in 2022 have provided substantial insights into the domain of design research and the employment of visual methodologies. These workshops, characterised by a hands-on approach and collaborative involvement, have played a crucial role in shaping the research landscape for the participating doctoral projects. They not only facilitated the integration of researchers' perspectives into the analytical process but also fostered deeper engagement among participants. The multifaceted feedback stemming from this process acted as a catalyst, eliciting memories and emotions, thereby enhancing the richness of the research endeavours.

Moreover, these workshops have emphasised the importance of collaboration and interdisciplinary approaches in doctoral design research. Including students from diverse academic and cultural backgrounds has brought a wealth of fresh perspectives and insights to the research process.

The initial workshop, characterised by collaborative interpretation, showcased the potential contributions of colleagues in selecting and refining samples from the photographic collection. This collaborative effort significantly contributed to identifying suitable images for analysis and communication, enhancing the accuracy of emerging typological classifications, and leading to the adoption of a central type of definition for the research object.

The subsequent workshop facilitated the emergence of core concepts and terminologies rooted in analysing research images collected through fieldwork. These concepts, originating from the feelings, impressions, and perceptions expressed by the focus group, have played a crucial role in clarifying the research concept and proposing a taxonomy of approaches to existing project management templates.

In summary, the collective and exploratory application of visual methods in the analysis and communication of research findings, exemplified by these workshops, underscores the potential for harnessing enhanced data to generate new knowledge and plan tangible outcomes for research projects.

The insights garnered through these workshops are not only beneficial to the participating doctoral projects but also contribute to the broader discourse on the effective integration of visual methodologies in design research and facilitating the writing process. The workshops highlighted the potential for the development of doctoral studies in a collaborative environment, challenging the prevailing practice of individual research. Subsequent workshops will be conducted with this collaborative premise, aiming to provide recommendations applicable in further doctoral contexts.

Five-Step Model for the Writing Process

Step 1: Selecting Images
Begin by choosing a diverse set of images relevant to the writing topic or theme. Encourage participants to select images that resonate with them or evoke specific emotions. Emphasize an intuitive selection process, prompting participants to trust their instincts.

Step 2: Making Paths
Once the images are selected, guide participants in organizing them into a visual sequence or path. This could be a chronological order, a thematic progression, or any other logical flow that helps convey a narrative. The goal is to create a visual storyboard that represents the intended structure of the written piece.

Step 3: Identifying Patterns
Prompt participants to observe the selected images closely and identify recurring patterns, themes, or motifs. This step involves a critical analysis of the visual elements to uncover underlying connections. Encourage discussions on how these patterns might translate into written content or thematic threads within the text.

Step 4: Creating Categories
Based on the identified patterns, guide participants in creating categories or sections for their writing. These categories should serve as organisational frameworks for different aspects of the content. Discuss how each category contributes to the overall narrative and helps maintain coherence in the written piece.

Step 5: Building Concepts
In this final step, participants use the selected images, organised paths, identified patterns, and created categories to build conceptual frameworks for their writing. Encourage them to articulate the central concepts, themes, or arguments that will form the backbone of their text. This step involves synthesising visual observations into written ideas, laying the foundation for the writing process.

This Five-step model exercise not only enhances the writing process but also encourages a dynamic interplay between visual and verbal thinking, fostering a creative and structured approach to content development.
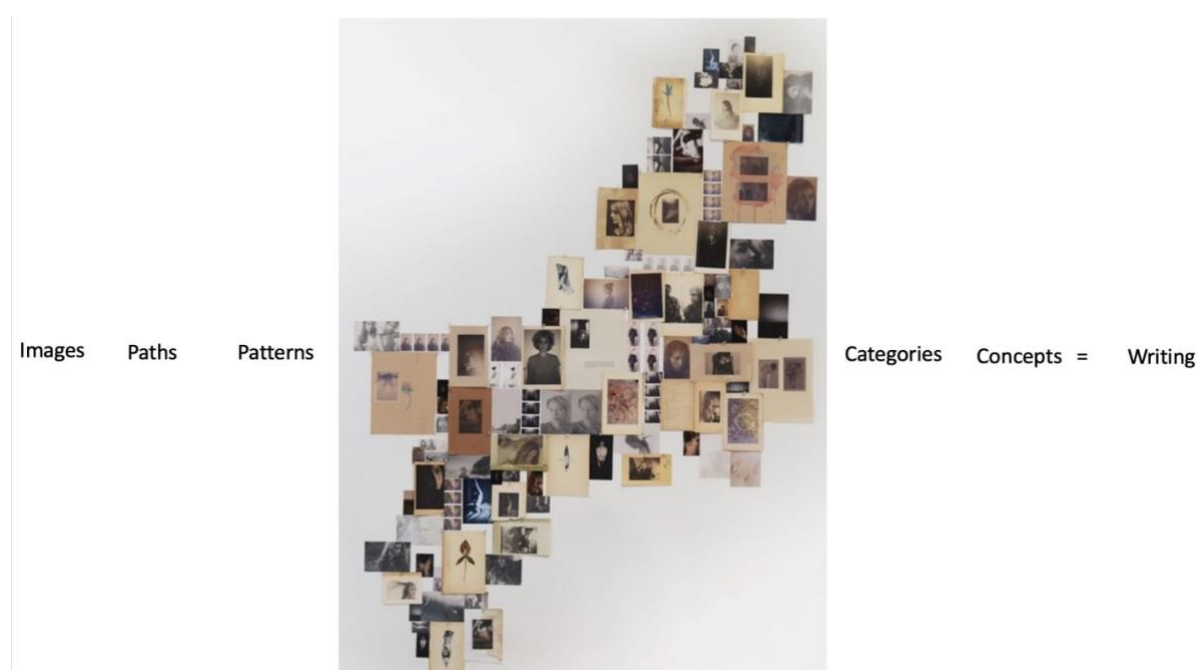
Fig. 11. Five-step model exercise employing images to facilitate the writing process.
Source. Author: 2023.

Conclusions

In conclusion, this paper highlights the transformative potential of a pedagogical exercise that employs images as catalysts to enhance the writing process for first-year PhD Design students at the University of Porto. The exercise not only addresses the fundamental objectives of refining the research scope and empowering students to articulate the boundaries of their research but also serves as a valuable tool for students enrolled in Research Methodologies.

The significance of this exercise is underscored by the inherent challenge design students face in expressing their thoughts in writing. In the context of design education, emphasise the importance of recognising and accommodating diverse cognitive processes, as evidenced by

the transformative nature of the pedagogical exercise. Recognising their cognitive processes as inherently visual, the exercise leverages images as catalysts and gateways to navigate the intricacies of writing a PhD thesis. This acknowledgement becomes particularly crucial as proficient writing skills become a prerequisite in pursuing a doctoral degree in design.

The study, conducted with approximately ten first-year students applying design methodologies to diverse problem areas, offers valuable insights into the effectiveness of the exercise. It serves as a bridge for students tackling issues beyond the traditional design realm, including medical equipment and communication design. The exercise's impact extends beyond immediate skill development, positioning it as a catalyst for interdisciplinary thinking and problem-solving.

The comprehensive methodology employed in this study, encompassing retrospective observation, visual analysis, and interviews, contributes to a nuanced understanding of the exercise's evolution and impact. Anticipating a model, the Five-Step model for the writing process, for effectively conducting this pedagogical exercise, the research lays the groundwork for aiding future design students in honing their writing skills. The proposed model, informed by insights from retrospective observations and student interviews, is poised to be a valuable resource for educators and institutions seeking to address the unique challenges design students encounter in expressing themselves in written form.

Ultimately, this research reinforces the importance of recognising and accommodating diverse cognitive processes within design education. By embracing the visual nature of design thinking and providing a structured approach to developing writing skills, this pedagogical exercise not only enriches the academic journey of current students but also lays a foundation for the continuous improvement of design education methodologies.

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Cognitive Discourse Function and Multimodal Conceptualization: The Interactive Usage of Language, Multimodality, and Cognition in Bilingual Teaching Context

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Abstract

This study aims to examine the realization of Cognitive Discourse Function and multimodal conceptualization in the context of bilingual teaching materials in Taiwan elementary schools. Based on a usage-based cognitive analysis, our data will classify how different categories of Cognitive Discourse Function (CDF) can be realized through language and multimodality in bilingual teaching and learning contexts to enable bilingual teachers to instruct and guide the students to achieve the educational goals and to help the students comprehend and conceptualize the abstract, complicated, or new concept, take the actions, and present their ideas or opinions through the learning process. This study proposes to extend previous findings on language and multimodality and incorporate the tenets of Cognitive Discourse Function to adopt the cognitive usage-based analyses to examine the teaching materials, including bilingual text books and multimodal resources. This study aims to demonstrate that the interactive use of language and multimodality not only helps to achieve the cognitive discourse functions efficiently but also enables the students to (1) facilitate the interpretation process when they start to learn new things or difficult concept; (2) strengthen the motivations to achieve educational goals effectively; (3) create the opportunities to reach the shared goals; (4) learn to help, share, and cooperate with each other through multimodal conceptualization, interaction, and engagement in the classroom.

Keywords: Cognitive Discourse Function, Multimodal Conceptualization, Bilingual Teaching, Multimodality, Educational Goals

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Introduction

Background: The Link Between Bilingual Education and Cognitive Discourse Function

As bilingual education received nationwide attention and developed rapidly in Taiwan, Content and Language Integrated Learning (CLIL) (Coyle, Hood & Marsh, 2010) has been a significant approach for bilingual teachers to integrate content, literacy, and language in several courses, including bilingual science, art, physical education, and integrative activities, in the elementary schools in Taiwan. CLIL is a dual-focused educational approach in which a second or foreign language is used for the learning and teaching of both content and language in an academic subject. However, previous CLIL research addressed the specific-subject learning goals and the language proficiency respectively over the past decades. While the importance of integration of "the content and language" is receiving more attention, more studies shift the focus to the issue of academic language competence that progresses knowledge construction and meaning-making, which contains cognitive structure and concept formation (Coyle & Meyer, 2021). In addition, according to Communicative Competence (Hymes, 1972), the original conception of concept is necessary to include communication in educational context. Therefore, recent studies on Cognitive Discourse Function (CDF) (Dalton-Puffer, 2013; Coyle & Meyer, 2021) claim that CDF could serve as the useful link to (1) connect between language learning and subject education, (2) integrate the process of conceptualization and communication, and (3) equip learners with the linguistic competences that are required for educational success with deeper learning in the CLIL classroom. Operating at the interface between thinking and language, CDF, the conceptual integration of subject and language pedagogies, plays a crucial role in deeper learning. The fundamental idea of CDF is to consider speech acts as verbal action, which means that verbalizations are connected to cognitive processes or strategies of the curricular content. CDF construct (Dalton-Puffer, 2013) links "subject specific cognitive learning goals" with the linguistic representations they receive in classroom interactions.

Previous research on Cognitive Discourse Function mainly focused on the usage via verbalization and classroom interaction in CLIL Physics, Finance, History, Chemistry (Breeze & Dafouz, 2017; Morton 2020, Evnitskaya & Dalton-Puffer 2020) which are the subjects for middle school, high school, or higher education in Austria, Spain, and other countries in Europe. However, CDF has rarely been examined and analyzed in the subjects of elementary education yet. Therefore, this study aims to fill the research gap by extending the CDF construct, which involves seven categorization of verbalizations that express acts of thinking about academic content in the classroom, into Taiwan elementary bilingual classrooms to find answers to the questions of what and how CDFs serve as the link between content and language in those contexts. This study would be using the CDF construct as a model of examining local CLIL bilingual educational context in Taiwan based on the multimodal data that combines not only verbalization but also the multimodality used to achieve learning goals through classroom interaction, hoping to provide a cognitive function-based analysis to contribute to bilingual education for teachers and students in elementary schools in Taiwan and worldwide.

Extending the previous studies on language, multimodality, and cognition (Lin, 2015; Lin & Chiang, 2016; Chen & Lin, 2021), this study incorporates the tenets of Cognitive Discourse Function (Dalton-Puffer, 2013) to adopt the cognitive function-based analyses to examine the multimodal aspects of bilingual classroom data, including the authorized teaching materials with open access. Although previous studies mainly focus on CDF emerged from

verbalization and classroom interaction, this study emphasizes that the interactive usage of "language/verbalization" and "multimodality" in CLIL classroom altogether helps to achieve the cognitive discourse functions efficiently, enable the students to facilitate the interpretation process when they start to learn new things or complex concept, strengthen the cognitive discourse functions to achieve learning goals, develop cognitive skills for creating joint attentions and shared goals, and learn to help, share, and cooperate with each other through multimodal conceptualization, interaction, and engagement in CLIL classroom activities.

The Cognitive Discourse Function (Cdf) Construct: The Link Between Content and Language

Based on the conceptual foundation of applied linguistics and education research, Dalton-Puffer (2013) points out that the CDF construct lies in the relationship of language and thought. Regarding the function of language, linguistic representation arises from usage events. Speech act theory also shows that intentional verbal actions could achieve a goal which might be non-verbal. In this case, CDF could reach the goal of making subject-specific thought observable; that is, students can interact the academic content verbally with each other, using recurring linguistic patterns in the classroom. Therefore, the basic idea of the CDF construct is that speech acts as verbal action, which means that verbalizations are connected to cognitive processes or strategies of the curricular content. It enables educators to communicate across subject boundaries as well. While the CDF construct could be thought as the crisscross of academic learning goals with the linguistic representations of cognitive process, it proposes seven basic categories that are called "CDF types". Each type is based on an underlying communicative intention formulated in pragmatics. In other words, these seven verbal actions are not only individual thought-processes but are acts of communication that are to be performed in fulfillment of curricular demands at the same time as shown in Table 1.

Function Type	Communicative Intention	Label
Type 1	I tell you how we can cut up the world according to certain ideas	CLASSIFY
Type 2	I tell you about the extension of this object of specialist knowledge	DEFINE
Type 3	I tell you details of what can be seen (also metaphorically)	DESCRIBE
Type 4	I tell you what my position is vis a vis X	EVALUATE
Type 5	I give you reasons for and tell you cause/s of X	EXPLAIN
Type 6	I tell you something that is potential	EXPLORE
Type 7	I tell you about sth. external to our immediate context on which I have a legitimate knowledge claim	REPORT

Table 1. CDF types and underlying communicative intentions (Dalton-Puffer, 2013)

Additionally, every CDF type does not stipulate which linguistic verb students have to perform. There is an accommodation of different (subject-) cultural models since its designations are not essentialist. What's more, to remember all the CDFs, the construct should be constrained, which can facilitate its operationalization and enhance its usefulness as a heuristic. Dalton-Puffer developed the CDF construct as illustrated in Table 2, including seven communicative intentions, the CDF types (central column), the performative verbs (right column), and the communicative intentions (left column). The construct of CDFs links "subject specific cognitive learning goals" with the linguistic representations they receive in

classroom interactions (Dalton-Puffer 2013:220). Each type is based on an underlying communicative intention (left column).

In other words, these seven verbal actions are not only individual thought-processes but are acts of communication that are to be performed in fulfillment of curricular demands at the same time.

Communicative intention	CDF type	Performative verbs
I tell you how we can cut up the world according to certain ideas	**Classify**	classify, compare, contrast, match, structure, categorize, subsume.
I tell you about the extension of this object of specialist knowledge	**Define**	define, identify, characterize.
I tell you details of what can be seen (also metaphorically)	**Describe**	describe, explain, label, name, specify.
I tell you what my position is vis a vis X	**Evaluate**	evaluate, judge, argue, justify, take a stance, critique, comment, reflect.
I give you reasons for and tell you cause/s of X	**Explain**	explain, reason, express cause/effect, draw conclusions, deduce.
I tell you something that is potential	**Explore**	explore, hypothesize, speculate, predict, guess, estimate, simulate.
I tell you about sth. external to our immediate context on which I have a legitimate knowledge claim	**Report**	report, inform, recount, narrate, present, summarize, relate.

Table 2. CDF construct (Dalton-Puffer, 2013)

Also, it should be noticed that these seven types of individual operations are co-dependent and interrelated. Additionally, every CDF type does not stipulate which linguistic verb students have to perform. The CDF construct has been empirically validated for different subjects in previous studies. For instance, the research in Austrian CLIL lessons (Dalton-Puffer et al., 2018) indicates that the CDF construct does occur in naturalistic CLIL classroom interaction across a range of subjects including social and natural science lessons as well as English as a Foreign Language lessons. Morton (2020) also argues that CDFs can be used as "building blocks" to build the bridge between cognition and language or thinking, speaking or writing.

In CLIL classroom, language and content are considered equivalently significant, which should not be delegated to the sole responsibility of language teacher or subject teacher. Accordingly, the integration that linking up language and content seems to represent a crucial issue, while communication and educational contexts could assist conception of concept (Hymes, 1972). In addition, in terms of pedagogy, preparing learners for their future is the aim of education; thus, it is essential to access and negotiate knowledge. As a result, to bridge the gap between language and content, cognitive discourse function (CDF) serves as the convergence of the curricular goals of the second language or foreign language education and subject-specific education.

Considering the notion of academic language, Dalton-Puffer (2013) states that it is the intertextual nature of language in educational contexts and the interdependence between

written and spoken language in the classroom. These discipline-specific discursive languages are visible in students' writing and use them as building blocks to develop their literacy (writing) skills. As a result, there is a need to look for convergences between the literacy and the specific text types (both oral and written) of communication (Morton, 2020), or so-called academic language, the language used to express knowledge and thinking in the classroom, with the regard of the context of use.

Research Gap and the Niche of This Study

Previous studies on CDF mainly focus on "verbalization" and show how cognitive processes could be linked to verbalization. However, this study aims to fill the gap by examining not just verbalization but the "multimodality and language" that teachers apply and share with the students in class. The interactive use of multimodality and language plays an important role for the bilingual classroom, especially during the increase of virtual learning due to the pandemic. As Dalton-Puffer claims, the goal of CDF is to serve as a "heuristic, operationalizability, interdisciplinary communication between educational linguists and subject teachers", this study believes it is important to include "multimodality" combined with verbalization as part of the analysis if meaning making process consisting of knowledge construction and knowledge communication are important to reach the cognitive goals of deeper learning in the CLIL classroom. Therefore, this study aims to collect and analyze the multimodal aspects of bilingual resources to explore how the interactive use of language and multimodality could enable the bilingual teachers to achieve CDF more effectively in CLIL classroom.

Aims of the Study

This study extends from the previous study on CLIL science in Taiwan elementary school (Chen & Lin, 2021) based on Cognitive Discourse Function construct as the model and further investigates the bilingual resources to find answers to the questions of what and how and to what extent CDFs occur in our elementary bilingual classroom in Taiwan. Extended from the CDF construct, the research questions raised in this study are listed as follows.

1. What is the general pattern and distribution of CDF applied in the bilingual resources in Taiwan elementary school?

2. What type of language and multimodality are often used to achieve specific CDF function(s), make learning visible, and reach the education goals effectively in bilingual classrooms?
3. Could it be possible that not only a single CDF function but also multiple CDF functions could be achieved through the teaching task?

With the emphasis on the interactive usage of language and multimodality, this study hopes to demonstrate how CDFs could be achieved as a useful link to efficiently connect and integrate language and content in bilingual classrooms, hoping to contribute to teachers and students to help them achieve their teaching and learning goals, develop cognitive skills for shared goals, and to cooperate with each other through multimodal conceptualization, interaction, and engagement in bilingual classrooms. By providing a cognitive function-based CDF analysis, this study hopes to shed light on the significance of interactive use of language and multimodality and raise the awareness of CDF, which could also contribute to the

effective process of course planning and teaching preparation for bilingual teachers in Taiwan elementary schools.

Method

By exploring and analyzing the usage of language and multimodality in bilingual resources, we hope to provide an account of the general pattern of the interactive usage of language and multimodality in educational context and how it can achieve specific cognitive discourse function. Data collection and research procedures would be introduced as follows.

Data Collection

The multimodal data analyzed in this study are collected from the teaching resource for bilingual lessons, including the subjects of Science and Integrative Activities, in Taiwan elementary school. In this study, the data is collected from the following categories:
1. Teaching resources: textbooks, teaching guides, teaching slides for instruction
2. Students' work: activity sheet, in-class activities, online assignment, show and tell group presentation, posters, etc.

Data Analysis

The data analysis is conducted with the following research procedures:

(1) **Language:** the use of performative verbs, sentence patterns, and keywords in academic language would be identified and analyzed based on its communicative intention and the CDF construct. Chinese and English will both be analyzed to see the general pattern and frequency of language use in bilingual classrooms.

(2) **Multimodality:** the use of multimodal teaching resources, including music, video, and hands-on activities, etc. is one of the main teaching strategies for bilingual classrooms in Taiwan elementary schools. In this step, we will investigate how multimodal teaching resources are incorporated with academic language to achieve the Cognitive Discourse Function(s) through different modes. The purpose is to see how language is combined with multimodality in an elementary educational context to achieve CDF and to help students comprehend and follow the instructions well.

(3) **Practice evaluation:** the language and multimodality analysis will be further evaluated with teachers during classroom observations, course evaluation interviews, and teacher's training workshops to discuss with teachers in practice and collect their opinions for detailed analysis to explain how and why specific CDFs are used and what goals are reached through the interactive use of language and multimodality.

Conclusions

Main Findings

In general, "classify, describe, and define" seem to be the most frequently occurring CDFs in our data. However, "explore and explain" are more emphasized in specific subjects like Science, while "evaluate and report" are more frequently found in Integrative Activities. This indicates that the bilingual teachers and students are achieving the CDF altogether effectively

through language and multimodality with different focus in specific subject based on the curriculum guidelines and the learning focus of the lessons. The pattern, distribution, and frequency of CDF are closely related to the content, the level, the fundamental belief and educational goals of specific subject.

To achieve CDF effectively, the performative verbs are not necessarily used in the instructions, instead, the bilingual teachers often convey the key concept through simple sentence structures, such as WH-questions and level-appropriate vocabulary while giving instructions, to achieve the cognitive discourse function and educational goals for better comprehension and classroom interaction. In addition, multimodality is often used interactively as the supporting resource to help students comprehend, scaffold the key concept, and reinforce through visual and aural modes, hands-on activities, and connection with daily life. Our discussion with local teachers and foreign teachers from bilingual classrooms also indicates that it is necessary for the teachers to simplify, design, and adjust their language and use the nouns, adjectives, and verbs that are suitable for their elementary school students based on the students' language proficiency level and the appropriate curriculum guidelines of English for each grade.

Multiple CDF functions could be achieved through integrative tasks designed for higher graders as there are more than one-on-one mapping relationships between the CDF and the language of/for learning (input) and language through learning (output), there may be more than one-on-one mapping relationships between the CDF, for example, the "more-than-one CDF integration" like "evaluate" and "explain" CDFs are sometimes achieved simultaneously by the teachers, "report", "explain", and "explore" could also be achieved altogether through the interactive use of language and multimodality in the teaching materials and classroom activities that require higher order cognitive skills. For further studies, more data and analysis need to be conducted to explain when and how such CDF integration plays a role and how it can benefit teaching and learning in bilingual classrooms in Taiwan elementary schools.

Implications and Future Research

This study aims to provide a usage-based account for the Cognitive Discourse Function and multimodal conceptualization in the bilingual educational context of Taiwan elementary schools. With the emphasis on the interactive usage of language and multimodality, this study hopes to demonstrate how cognitive discourse functions could be achieved as a useful link to efficiently connect and integrate language and content in bilingual classrooms, aiming to contribute to teachers and students to help them achieve the teaching and learning goals, develop cognitive skills for shared goals, and to cooperate with each other through multimodal conceptualization, interaction, and engagement in bilingual classrooms. Therefore, this study hopes to shed light on the significance of interactive use of language and multimodality and the awareness of CDF, which could contribute to the effective process of course planning and teaching preparation for bilingual teachers.

For further studies, we believe CDFs could be applied differently through language and multimodality based on different subjects, cognitive skills, and language proficiency level in bilingual classrooms. More data and analysis need to be conducted to discover the general pattern of CDF usage and provide an indexical account in a specific subject and explains how it can help the teachers and students to achieve the CDF and educational goals effectively and facilitate classroom interaction and engagement.

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Analysis and Development of the Content Structure of
the Content Marketing Design Course Using the Design Thinking Process

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Abstract
This content-structured training course was developed within the conceptual framework of design thinking. It puts the thinking system in the design of content marketing according to the stages of the design thinking process so that the learner will have a system of ideas in design and will be able to create effective content marketing. It is capable of designing high-quality work. In this study, issues were investigated and examined to ascertain the root cause of social business entrepreneurs' content marketing designs, tackle unsuccessful Content Marketing design issues, and use design thinking. A study and description of the steps involved in creating effective content marketing are available. And to include components of the Design Thinking process, such as its processes, methodologies, and tools, into the development and structuring of the instructional content. This course consists of 7 modules: 1) Concepts and principles of content marketing design 2) The process of content marketing design using design thinking 3) Empathizing with the target group 4) Defining the problem's framework in content marketing design 5) The process of generating ideas for content marketing 6) Making a content marketing project prototype 7) Testing and evaluation of content marketing projects. It was determined that the consistency, linkage, comprehensiveness, and appropriateness of this training content structure in relation to the anticipated learning goals were all at a satisfactory level during the evaluation process.

Keywords: Design Thinking, Content Marketing, Content-Structured

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Introduction

Business competition in the information age brings a lot of content into the digital world. It is like driving and indirectly controlling human behavior to feel good about the brand. Those things make consumers unconsciously become their customers. In business circles, this marketing strategy is called "content marketing." Content marketing has become a prevalent practice by designing business strategies and processes based on the creation and publication of valuable content in order to attract and retain a clearly defined audience and ultimately generate profitable customer actions (Champain, 2018). Content marketing has a moderate positive significant relationship with the consumer purchase decision (Ansari, et al., 2019), marketers can influence the sentiment of customers' digital engagement beyond their performance during customers' interactions, and for unfavorable event outcomes, informational marketer-generated content, more so than emotional content, can enhance customer sentiment. This study also highlights sentiment's role as a leading indicator for customer lifetime value. (Meire, et al., 2019), companies in Jordan could boost customer intention to purchase green products, by achieving word of mouth and presenting suitable marketing content (Al-Gasawneh and Al-Adamat, 2020).

Social enterprise is social innovation, which can be applied to business management principles to solve social problems. Interestingly, social enterprises in Thailand are mostly characterized by small community enterprises. (Techsauce Team, 2022) Obstacles that are not related to finance are a problem in understanding the general public's and consumers attitudes towards social enterprises. Building public buy-in will have a profound effect on the growth of social enterprises. This will create many opportunities for social enterprises, including increasing demand for social business products and services, solving the problem of attracting talented employees to work with social enterprises, and providing access to capital (Rojphongkasem, 2021).

Design thinking is a comprehensive customer-oriented innovation approach that aims to generate and develop creative business ideas or entire business models. Essentially, design thinking attempts to project designers' approaches and methods onto business processes. The approach is ultimately applicable to all kinds of business ideas, whether they have a product or service character. The first mouse for the Macintosh computer was created after a similar approach, as was the first toothbrush with a wider ergonomic shaft. (Müller-Roterberg, 2018) Stanford D. School, Serie, IDEO & Riverdale, and Google Design Sprints presented a model of the design thinking process in 5 stages (Rattanaphaisankit et al., 2021), which are as follows: empathize, define, ideate, prototype, and test. Design thinking is the combination of what humans want, what technology makes possible, and what is economically possible, so that those who have never trained as designers can use creative tools to solve a wide range of challenges. Design thinking is a course that focuses on deep understanding of problems by putting real users at the center of finding information and bringing those problems to creativity, design, testing, and development, resulting in innovations that respond directly to users. Thus, design thinking becomes a crucial instrument for ensuring that organizations operate efficiently and sustainably. (The101.world, 2019) The development of human comprehension with an emphasis on practice and learning from experimentation and iterative work processes, creative thinking, and user testing contributes to the development of novel ideas and superior solutions by continually learning from and minimizing mistakes and increasing the likelihood of mission success. In addition, user information is gathered throughout the process in order to improve the design and best accommodate the needs of the intended audience. The top design institutions and businesses in the world have been

continuously improving human-centered design processes and methods of work for decades. (Israsena-na-Ayudhya, Treerattanaphan, 2017) Tangpakdee (2017) used design thinking to investigate the outcomes of developing instructional design competencies for media production by combining the community-based teaching model with the design thinking process in students. It was discovered that students who studied with a community-based teaching model and the design thinking process had higher self-assessments in all aspects of instructional design competence for media production.

The majority of social enterprise entrepreneurs, according to the survey, manage their own content marketing but lack the skills necessary to create original material. (Sathapornwachana et al., 2020) And the majority of them have used design thinking before. Adopting the Design Thinking method as a framework for training in content marketing design courses will therefore make it easier to promote and develop the skills of social enterprise entrepreneurs in content marketing design.

As stated previously, the majority of social enterprise entrepreneurs conduct content marketing on their own but lack the ability to design content marketing. According to studies, design thinking is a process for producing quality design work. Consequently, using the Design Thinking process as a conceptual framework for creating training content in the content marketing design course will help promote and develop the capacity of social enterprise entrepreneurs to design content marketing.

Aim of the Study

This study aimed to analyze and develop a learning content structure for short-term training on the subject of "Content Marketing Design using the Design Thinking Process." and to verify the consistency, connection, comprehensiveness, and appropriateness of the content structure of the course "Content Marketing Design Using the Design Thinking Process."

Method

Participants, Procedure and Data Analysis

This research was conducted in two processes: the first step is the analysis and development of the course content structure of "Content Marketing Design Using the Design Thinking Process." We use documentary studies to examine strategies that facilitate successful content marketing, categorize efficient content marketing techniques based on the design thinking concept and employing backward design principles, and formulate the content framework for the content marketing design course. The second step is the assessment of the consistent, connected, comprehensive, and appropriate content structure of the course "Content Marketing Design Using the Design Thinking Process." We deliver the content structure file titled "Designing Content Marketing with the Design Thinking Process" along with the evaluation survey of how well the content structure aligns with the desired learning goals in terms of consistency, coherence, comprehensiveness, and appropriateness. Email a proficient in instructing Content Marketing and a proficient in instructing Design Thinking. Subsequently, proceed to aggregate all the available data and conduct a comprehensive statistical analysis employing measures such as the mean, percentage, and standard deviation. The analysis yields data that is then presented in a descriptive format.

The Findings and Results

In the first step, we analyze and develop the course content structure for "Content Marketing Design Using the Design Thinking Process." We use documentary studies to examine strategies that facilitate successful content marketing, categorize efficient content marketing techniques based on the design thinking concept and employing backward design principles, and formulate the content framework for the content marketing design course. We found the causes of the inefficiency of content marketing. From studying the opinions of marketers in articles on content marketing by Smart SME (2016), Molek (2017), Wongrianthian (2017), Elevation Marketing (2018), Rock Content Writer (2021), Brendan (n.d.), and Duris (n.d.). We have summarized the information into a fishbone diagram. As depicted in Figure 1 below: 1) Content distribution lacks continuity. 2) There is a lack of both an action plan and a strategy plan. 3) Content promotion is absent. 4) There is no review process in place to enhance content development. 5) The quality of the content is inadequate. 6) There is only a single channel.

Figure 1: The causes of the inefficiency of content marketing

We have identified the underlying factors contributing to the lack of effectiveness in content marketing. By examining the viewpoints of marketers in various articles on content marketing by Molek (2017), Wongreanthong (2019), S.Worapol (2020), The Growth Master Team (n.d.), Steps Academy (2017), Champion (2018), Hall (2020), Haden (2018), Forbes Agency Council (2020), Memon (2021), Gartner (2019), and Content Shifu (n.d.), we have synthesized information and summarized the key processes that contribute to the success of content marketing. These processes include conducting research and situation analysis, establishing goals and key performance indicators (KPIs), analyzing the brand, selecting the target audience, gaining a deep understanding of the target audience, identifying customer problems, developing content strategies, choosing the appropriate channel or format, generating ideas and conceptualizing them, selecting compelling content, conducting keyword or content research, creating a content calendar, establishing a production schedule, producing the content, publishing and promoting the content, and measuring results and making improvements. We have analyzed to find out the base of the problem and have identified consistent solutions based on the major processes that contribute to the success of content marketing, as presented in Table 1. Continue by categorizing efficient content marketing procedures using the design thinking process framework and create the conceptual framework of content marketing design using the design thinking process, as presented in Table 2 and Figure 2.

An inefficient content marketing cause	Solution for inefficient content marketing
1. No continuity 1.1 No publishing schedule 1.2 No production schedule 1.3 Unfinished content 1.4 Neglecting continuity 1.5 Not knowing how to do it	• Create a Content Calendar • Content production schedule • Content production schedule
2. No clear plan or strategy 2.1 Missing situation and problem analysis 2.2 Not appropriate for the target group 2.3 No analysis of competitor strategies 2.4 Not determining the goals 2.5 Using the Wrong Keywords	• Research and situation analysis • Writing content strategies • Research and situation analysis • Writing content strategies • Setting goals and KPIs • Writing content strategies • Setting goals and KPIs • Writing content strategies
3. No Promotion 3.1 Ignoring the importance 3.2 No key distribution channels 3.3 No sharing 3.4 No budget 3.5 No planning	• Choose the channel or format • Publish and promote • Writing content strategies • Create a Content Calendar
4. non-evaluation and improvement 4.1 Lacking KPIs 4.2 No following 4.3 Indicators not consistent with goals 4.4 Not knowing the tools to do it	• Setting goals and KPIs • Measure results and improvement • Writing content strategies
5. Poor Content Creation 5.1 Focus on content rather than customers 5.2 Emulate others content 5.3 Too much selling in the content 5.4 Unfocused Direction	• Deeply understand the target audience • Identify customer problems • Create and produce content • Choose attractive content • Writing content strategies • Brand's personal analysis • Brainstorm Ideas and conceptualize • Measure results and improvement
6. Single Channel 6.1 Ignoring the importance 6.2 No planning 6.3 Insufficient staff 6.4 Not knowing how to do it	• Writing content strategies • Create a Content Calendar • Choose the channel or format

Table 1: An effective solution for the inefficiency of content marketing

Design Thinking Process	Solution for inefficient content marketing
1. Empathize	• Choose the target audience • Deeply understand the target audience
2. Define	• Identify customer problems • Research and situation analysis
3. Ideate	• Setting goals and KPIs • Writing content strategies • Brainstorm Ideas and conceptualize • Choose the channel or format • Keyword or content research • Create a Content Calendar
4. Prototype	• Create production schedule • Create and produce content
5. Test	• Measure results and improvement

Table 2: Categorizing efficient content marketing procedures
using the design thinking process framework
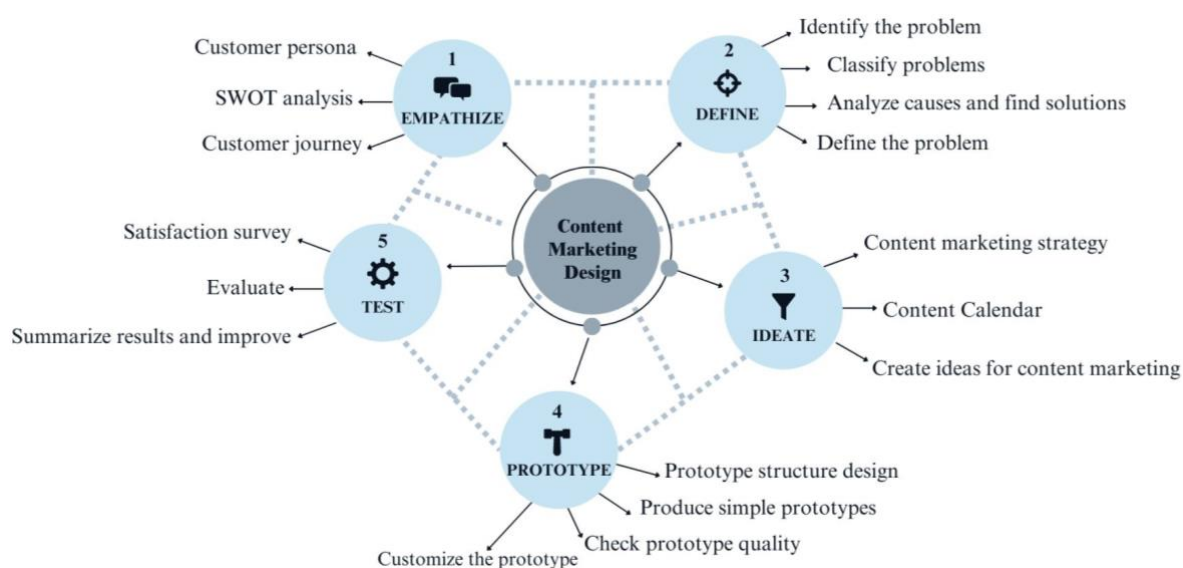
Figure 2: Conceptual framework of content marketing design using
the design thinking process

This content marketing design course is primarily designed using a design thinking process as a short-term training program (16 hours). We employ the principles of backward design, starting with setting learning goals and objectives (Table 3) and selecting relevant content. (Figure 3) The content is divided into 7 modules, which include: 1) Concepts and principles of content marketing design 2) The process of content marketing design using design thinking 3) Empathizing with the target group 4) Defining the problem's framework in content marketing design 5) The process of generating ideas for content marketing 6) Making a content marketing project prototype 7) Testing, as presented in Figure 4.
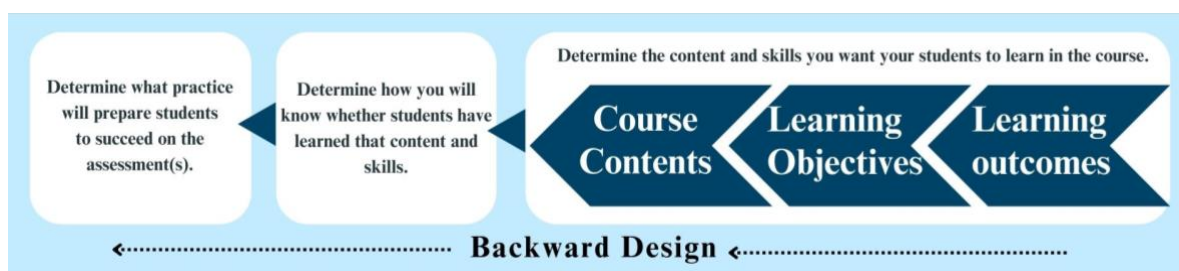
Figure 3: Processes for developing the course's content structure

Learning Outcomes	Learning Objectives
1. Learners are able to apply concepts and principles in designing content marketing appropriately.	1.1 Learners can define content marketing. 1.2 Learners can learn about the benefits of content marketing. 1.3 Learners can tell the heart of content marketing. 1.4 Learners can take examples of content marketing presentations. 1.5 Learners can take examples of content characteristics in content marketing. 1.6 Learners can take examples of content marketing objectives. 1.7 Learners can take examples of the video content concept.
2. Learners are able to use the design thinking process to design prototype content marketing projects.	2.1 Learners can describe the stages of content marketing design using the design thinking process. 2.2 Learners can classify the methods and tools used in each of the content marketing design steps using the design thinking process. 2.3 The students explained the importance of content marketing design through the design thinking process.
3. Learners able to deeply understand the target audience for content marketing.	3.1 Learners can do customer persona correctly. 3.2 Learner can analyze the SWOT of the client's representative. 3.3 Learners can accurately analyze the customer's journey.
4. Learners are able to define content marketing problems.	4.1 Learners can identify the problems of the target group. 4.2 Learners can classify the problems of the target group. 4.3 Learners can analyze the causes and identify solutions of problems. 4.4 Learners can identify problems that match the target group.
5. Learners are able to create ideas for content marketing.	5.1 Learners have a good content marketing strategy. 5.2 Learners completed the content calendar properly. 5.3 Learners find ideas for how to do content marketing properly.
6. Learners are able to create a prototype content marketing project.	6.1 Learners can design a project prototype properly. 6.2 Learners can easily produce project prototypes. 6.3 Learners can check the quality of the project prototype. 6.4 Learners can customize project patterns for quality.
7. Learners are able to test and evaluate a content marketing prototype.	7.1 Learners can explore content marketing satisfaction. 7.2 Learners can evaluate their content marketing project patterns. 7.3 Learners can summarize the content marketing outcomes.

Table 3: Learning goals and objectives of course
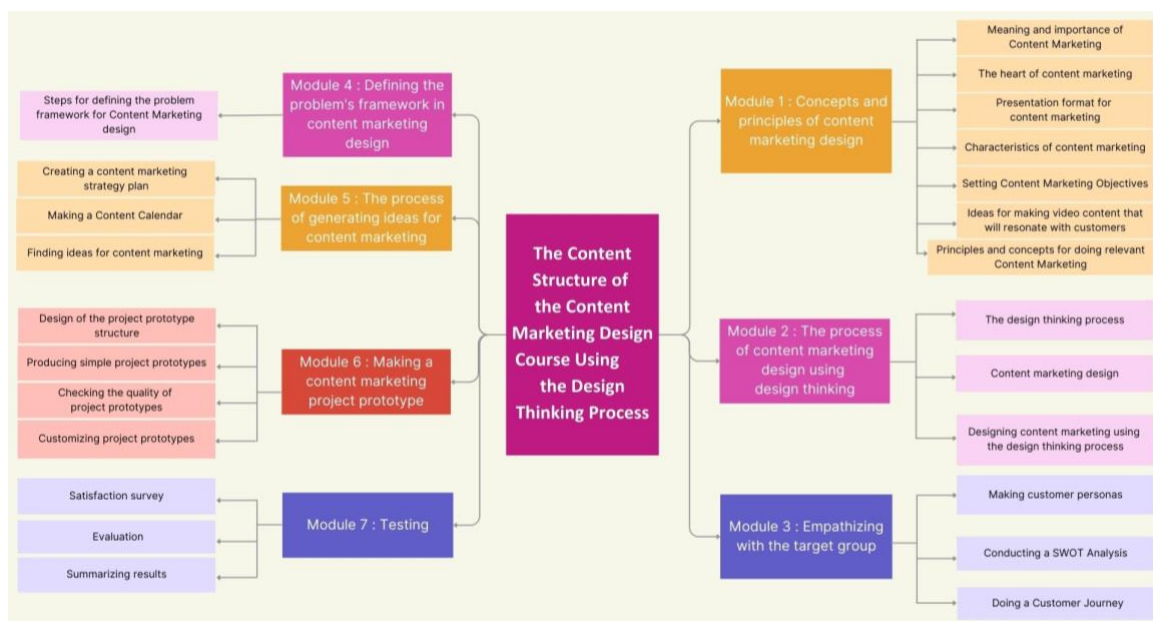
Figure 4: The Content Structure of the Content Marketing Design Course
Using the Design Thinking Process

In the second step, the process is an assessment of the consistent, connected, comprehensive, and appropriate content structure of the course "Content Marketing Design Using the Design Thinking Process." According to the survey, the content structure of the course is consistent, connected, comprehensive, and appropriate, which total is at a good level ($\bar{X}$=4.45, SD=0.08). The course's learning outcomes ($\bar{X}$=4.55, SD=0.69) are at a very good level. The learning objectives of the course ($\bar{X}$=4.45, SD=0.52), the content structure of the course ($\bar{X}$=4.45, SD=0.52), and the conceptual framework of the course ($\bar{X}$=4.36, SD=0.50) are all at a good level, as presented in Table 4.

Evaluation list	Average	SD	Quality level
1. The conceptual framework for developing content marketing using the design thinking process is consistent, connected, comprehensive, and suitable.	4.36	0.50	good
2. The main content of the course is consistent, connected, comprehensive, and suitable.	4.45	0.52	good
3. The learning outcomes of the course are consistent, connected, comprehensive, and suitable.	4.55	0.69	very good
4. The learning objectives of the course are consistent, connected, comprehensive, and suitable.	4.45	0.52	good
5. The content structure of the course is consistent, connected, comprehensive, and suitable.	4.45	0.52	good
Total	4.45	0.08	good

Table 4: The results of the assessment of the consistent, connected, comprehensive, and appropriate content structure of the course "Content Marketing Design
Using the Design Thinking Process"

Conclusion & Discussion

We have analyzed and developed the content structure of the course "Content Marketing Design Using the Design Thinking Process" into 7 modules: 1) Concepts and principles of content marketing design 2) The process of content marketing design using design thinking 3) Empathizing with the target group 4) Defining the problem's framework in content marketing design 5) The process of generating ideas for content marketing 6) Making a content marketing project prototype 7) Through testing and evaluation, it was found that the content structures of the courses were consistent, connected, comprehensive, and appropriate at a good level. In the structure of course content in Module 1, there will be basic knowledge, concepts, and principles. Module 2 will provide basic knowledge of two main topics: the matter that we need design thinking to help in designing and the matter of design thinking, and modules 3–7 will be 5 steps of the design thinking process that apply tools in each step of the design thinking process to the course content, Bootchuy (2016) studied the development of a form of online knowledge sharing using design concepts combined with future analysis techniques to strengthen the business creativity of a graduate student in management. With the process of forming an online knowledge share, it consists of six stages, namely: 1) illuminating ideas 2) knowing future directions 3) analyzing target groups 4) creative ideas 5) developing ideas 6) presenting and publishing, which will be seen as the structural sequence of knowledge delivery in stages 3-6 is similar, the critical design thinking elements and not just use tools such as the business model canvas or processes like Lean Startup. Too often these tools are applied in a more cursory fashion when a deep dive approach is needed that focuses on the key elements of design thinking illustrated in Figure 5 (Sarooghi, et al., 2019).
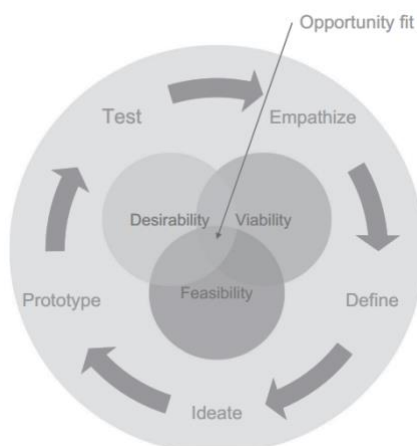
Figure 5: Opportunity Design Framework (Sarooghi, et al., 2019)

Incorporating design thinking in the business curriculum can provide students and instructors with a framework for dealing with unstructured problems and for managing the innovation process. However, many business students, like many business professionals, experience confusion and frustration when engaging in design thinking projects for the first time. This paper provides guidance for faculty who are considering incorporating design thinking projects into their business classes. For such projects, the complex, iterative process of design thinking is structured to include six phases: problem finding, observation, visualization and sense making, ideation, prototyping and testing (Glen, R., 2015), as presented in Figure 6.
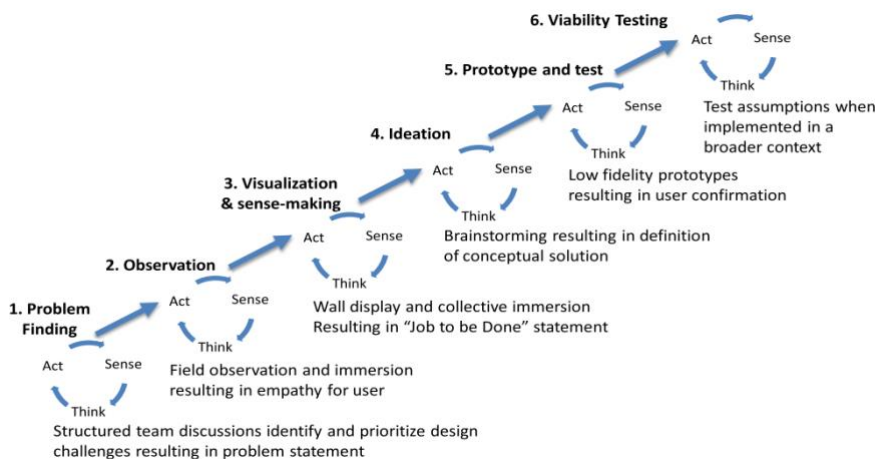
Figure 6: Design thinking framework (Glen, R., 2015)

This content marketing design course is primarily designed using a design thinking process as a short-term training program (16 hours). We employ the principles of Backward Design, starting with setting learning goals and objectives and selecting relevant content, backward design is a process for designing courses that entails three steps: 1) determine the content and skills you want your students to learn in the course. (What are the course learning outcomes?) 2) determine how you will know whether students have learned that content and skills. (What assessment(s) will students complete to demonstrate measurably that they have met the course learning outcomes?) 3) Determine what practice will prepare students to succeed on the assessment(s). (What will the nature, frequency, and sequence of learning activities be in the course?) (Rochester.edu, n.d.), which in this research uses the conceptual framework of step 1) to design the structure and select the content in this course. Backward design has been widely adopted to develop college/university-level courses for both online and face-to-face environments. A major benefit of this model is that it centers us on teaching our learners what they need to know and not on covering textbook chapters (often filled with nice to-know). Another name for Backward Design is "Learner-Centered Design." Using it as the design model and communicating expected course learning outcomes grounds our courses, making it clear to learners why they are being presented with the selected course materials and assignments. (Muhlenberg College, n.d.) The backward design model is presented in Figure 7.
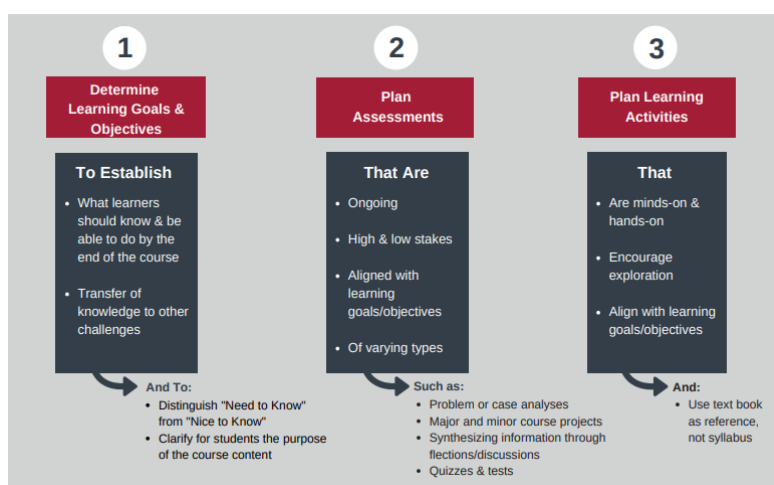
Figure 7: backward design model (Muhlenberg College, n.d.)

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Measuring the Effects of Student Satisfaction and the Engagement Level of Personalized Adaptive Learning Using an AI-Enabled Learning Pathway Tool

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Abstract

Critical voices on the traditional "one-size-fits-all" education system, which assumes a uniform approach for all students, abound for not meeting individual student learning needs. Expecting teachers to cater to the diverse learning needs of each student is seen impractical and unrealistic. There is a growing demand for personalized student-centered education, aiming to accommodate the unique learning needs, abilities, and interests. Modern educational systems are incorporating innovations like Artificial Intelligence (AI), which not only personalize students' educational experiences but also make them adaptive. The concept of Personalized Adaptive Learning (PAL), which systematically tailor instruction to individual learners has gained prominence as a key educational reform effort in contemporary systems. As more teachers embrace PAL, it presents an opportunity to explore the relationship between student satisfaction and their level of engagement. In this study conducted in Singapore, PAL was implemented to 1061 students across three subjects – theory-based marketing, calculation-based statistics, and procedural airway bill calculation. The analysis is done by using factor analysis, Kruskal-Wallis test, Friedman test and Kendall tau correlation coefficient. The results revealed significant differences in the ratings of the three subjects between different constructs (lesson content, personalization and mobile devices) except for the system user interface construct. Moreover, there was a significant difference between all constructs among the students. Interestingly, the level of engagement is significant for three constructs: system user interface, lesson content and personalization. These findings provide insights into the factors that are likely significant antecedents for planning, designing and implementing PAL to enhance student satisfaction.

Keywords: Learning Pathway, Personalization, AI

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Introduction

In recent years, there has been a remarkable increase in the adoption of education technology. Educators and policymakers have endeavored to personalize education to solve achievement gaps, lack of student motivation, and more effective and efficient instruction (Tetzlaff et al., 2020). In the Singapore context, to enhance teaching and learning, educational institutes are encouraged to embrace new teaching methods and technologies to cater to learners of diverse backgrounds to relieve teachers' workload and enable them to focus on areas such as learners' social-emotional development (Chan, 2022). According to Ng (2022), the integration of artificial intelligence into education systems could spark the greatest positive transformation in educational systems (Khan, 2023). Artificial intelligence could contribute to creating a personalized education system for each student that caters to his strengths and interests and adapts to the way they learn.

Personalized adaptive learning (PAL) seeks to tailor the learning experience to each student's individual learning style to address the individual needs and interests through "what, when, how and where students learn" (Costa, Rebeca & Tan et al., 2021). Along with AI bringing remarkable advancements to learning systems by enhancing their technology through the optimizing of key components - domain knowledge, the learner's current knowledge level, instructional measures like assessments, and the user interface. By integrating technologies such as AI as part of the digital learning environment, PAL platforms could build customized learning paths to meet the diverse needs of every learner based on the just-in-time profile of learners' motivation or learning gaps painted by AI-enabled data. Eventually, PAL suggests optimal choices of learning activities or pathways, departing from the traditional approach of delivering content through mass lectures. In the affordance of adaptive learning technologies, educators can rely on the analytics and learning algorithms generated based on the students' digital learning footprints to identify gaps in learning, analyze real-time updates of their performance and progress to improve their learning (Educause Learning Initiative, 2017).

The worldwide pandemic has accelerated the transformation of the traditional education system, resulting in a significant demand for asynchronous e-learning. This shift presented unique challenges to educators, in terms of mindset change and a change in skillset applied in classroom practice. While face-to-face contact in classrooms has been limited, both educators and learners must adapt to new technologies and teaching and learning methods. PAL empowers learners to take ownership of their learning experience (Yazon et.al., 2002) as they have greater control over the content they study and the pace at which they learn anytime anywhere and expedite their future continuous learning (Walkington, 2013). Despite its potential benefits, there are difficulties associated with designing, implementing and measuring PAL which is a complex undertaking fraught with challenges. These include user-perceived adequacy of the system user interface, user satisfaction with personalized learning packages, organizing content, and use of mobile devices to support learning.

A learning environment is made up of various dimensions elements that influence students' learning experiences and outcomes. According to Fraser et al. (2012), while the physical and social aspects are essential, instructional strategies and learning resources are also necessary to facilitate conceptual understanding and cultivate knowledge acquisition. Studies indicate that learner satisfaction and self-efficacy have an impact on learning and learning outcomes (Yakubu & Dasuki, 2018; Zogheib et al., 2015). Learner satisfaction is widely recognized as an indicator of the effectiveness of a learning system (Forster et al., 2020; Oho, 2017). Thus, learner satisfaction and acceptance should be considered when assessing a learner's

perception of any learning system. Learner satisfaction refers to how learners perceive a particular learning system's usefulness and effectiveness in enhancing student learning outcomes, reflecting their personal feelings and experiences during learning activities, and how they perceive the learning systems' quality and engagement. Typically, if learners are more satisfied with a particular learning system, they are more likely to continue engaging with it (Salam, 2022). Cidral, et al. (2018), hence the importance of measuring learner satisfaction in assessing the long-term success of the learning system.

According to Klem and Connell (2004), there is strong empirical evidence supporting the connection between engagement and academic achievement, with engagement explicitly tied to academic tasks and activities. The instructional design and how the PAL system provides each learner individualized learning paths in real-time by allowing them to progress along their unique learning path through the course based on their knowledge, skills and learning needs are interlinked with the student engagement level. Engagement is considered multidimensional encompassing students' emotions, behaviour such as participation, and academic learning time (Fredricks, Blumenfeld, & Paris, 2004) which is critical in connecting important contexts and consequently affecting desirable outcomes. Both learner satisfaction and engagement are essential in helping stakeholders comprehend system functionalities, pedagogical support, and instructional design for a productive learning experience for all users. Therefore, there is a need to evaluate the effects of student satisfaction on the engagement level of PAL. The authors of a forthcoming paper will discuss the direct and significant relationship between engagement level and learning outcomes.

Background and Aims of Study

The institution at which our research was conducted, Temasek Polytechnic, piloted the PAL using the LMS Brightspace Learning Pathway (Brightspace LeaP). LeaP is a PAL tool that builds personalized learning paths for learners without leaving the LMS (D2L, 2023). How does LeaP work? LeaP determines and recommends instant personalized learning paths based on course-specific learning objectives, activities and assessments that adjusts to each learner's learning state and needs as they interact with the tool by the semantic mapping of objectives, learning resource, assessment questions and mastery information of each learner. This can be useful for a range of personalized activities such as reviewing content, preparing for tests, providing remedial support for struggling learners, or even functioning as a primary or secondary source of learning. With this feature, teachers can save time and reduce their workload and thus enhancing work productivity.

In this study, we have implemented LeaP to 1,061 students across 3 subjects for a full semester, each offered by different school, at an educational institute of higher learning in Singapore with a total population of about 13,000 students. LeaP served as additional revision materials for Subject A and Subject C, aiding students in their preparation for the Mid-Term test. Additionally, it was utilized as a revision package to prepare students for the skill-based assessment in Subject B's Practical test. The LeaP packages are embedded in the LMS and was made accessible to students taking these 3 subjects at least 2 weeks prior to the respective assessments till the end of the semester for students to use the tool for final exam revision if needed. The breakdown of students is shown in Table 1. A brief orientation was provided at the beginning of the semester with the purpose of using LeaP and providing guidance on the use of LeaP packages during designated lesson weeks. At the end of the semester, we felt that it would be an opportune time to evaluate the effects of student satisfaction on the level of engagement in PAL. To achieve this, we employed a

questionnaire as our primary research instrument. Our objective was to ascertain whether there were any noticeable disparities in the constructs used for the questionnaire and to determine the relationship between satisfaction and engagement of PAL. Additionally, separate ethical consent for data collection is not obtained for several reasons. Firstly, LeaP is integrated as a learning tool within the existing learning system and is accessible to all students enrolled in the three subjects. As part of the course enrollment process, students have already provided consent for the use of the learning system and covers the use of LeaP as well. Furthermore, the data is collected in an aggregated form where the anonymity of the students are ensured.

The research questions for this study are as follows:
- Are there significant differences between perceived satisfaction among the students?
- Are there significant differences between perceived satisfaction within the subjects?
- Are there significant relationships between perceived satisfaction and engagement among students?

Our research is driven by a straightforward motivation - we firmly believe that higher levels of student satisfaction can boost student engagement in a course, leading to improved student learning outcomes (Gray and Diloreto, 2016). We aspire our study to contribute to the refinement of the instructional design of the PAL, with the goal of better catering to the needs of individual learners.

	Subject A (Offered by School A)	Subject B (Offered by School B)	Subject C (Offered by School C)
No. of Classes	24	20	2
Year of Study	1	1	3
No. of Teaching Staff	11	6	2
No. of Students taking the subject	539	484	38
No. of Students tried LeaP and took the survey	315	135	36

Table 1: Profile of participants

Methodology

As this study assumes a quantitative methodology, a questionnaire is employed as our primary research instrument, focusing on the learners' satisfaction with the system user interface, personalized learning packages generated, the content organized, and the effectiveness of accessing LeaP using mobile devices. Quantitative surveys are useful for obtaining a large amount of information from a large sample size in a relatively short period of time. The use of questionnaires can provide standardized and consistent data collection, which is helpful when measuring subjective opinions and attitudes (Kabir, 2016). Quantitative research is also useful for identifying patterns and relationships among variables, which can be helpful in identifying potential factors that may influence learners' satisfaction with the PAL system.

To have a more reliable comparison with the student engagement, LMS LeaP content reports for all 3 subjects were extracted. Diagnostic test results, which are also known as pre-tests, and activities the learner has done are used the rank the content's effectiveness in helping the learner understand the learning objective. Semantic algorithms are deployed to derive the relationship for each of the learning objectives, content items and questions within the course

content repository. Based on these three elements, LeaP makes intelligent individualized recommendation paths to offer reading content to the learners. Learners will then try the practice questions and take the post-test to evaluate their understanding of the defined learning objectives. Both the pre-test, practice questions and post-test attempts are recorded in the LMS LeaP content reports and are used for defining the 5 levels of engagement.

LeaP engagement level	Defined by
0	Attempted none of the tests
1	Attempted pre-test only
2	Attempted pre-test and practice questions
3	Attempted pre-test and post-test
4	Attempted pre-test, post-test and practice questions

Table 2: Level of engagement

In this study on learner satisfaction, a Likert Scale survey with 23 Likert Scale type questions that evaluated student satisfaction on 4 constructs (System User Interface (S), Lesson Content (L), Personalization (P) and Mobile Devices (M)). Additionally, 1 multiple-choice question was included to gain insight into why students did not use LeaP and 1 open-ended question was included to complement the quantitative data and enhance support for learning. Most of the survey questions were designed and adapted from prior research that focused on evaluating learner satisfaction and personalized learning by Lim, et al. (2022) and Zhang, et al. (2022). These learner satisfaction questions were validated in their research publications to support personalized learning experiences of students in high schools and tertiary institutes. However, an additional construct "M" is established to measure the mobile functionality provided by our learning. The validity of these constructs will be discussed in the findings later.

Data was collected using MS Forms, then analyzed using SPSS software and visualized using Power BI. Factor analysis was used to test the validity of the 4-constructs used, followed by reliability, Kruskal-Wallis and Friedman tests to determine if there is significant difference between the perceived satisfaction among students and within subjects. Lastly, Kendall's tau non-parametric correlation coefficient is used to measure the relationship between satisfaction and engagement.

Findings

Explanatory factor analysis is used to examine the factor structure of the 23-item instrument for a sample size of 486. This sample is large enough for factor analysis and the correlation matrix FOR all coefficients are greater than 0.3, suggesting that factor analysis is appropriate (Tabachnick and Fidell, 2007). The Kaiser-Meyer Olkin (KMO) measure of sampling adequacy is 0.968 and Bartlett's test of Sphericity have a significance level of 0.000 suggests that there is a high degree of correlation making factor analysis worthwhile.

Principal components factor analysis is applied as extraction technique with varimax as the orthogonal rotation method to extract underlying factors. The first 3 factors recorded eigenvalues of above 1 with a total of 73.916 per cent of the variance (Cumulative %). All the items in Figure 1 have absolute loading above 0.3.

Item Code and Description	Factor		
	1	2	3
P4_Enables me to choose what I want to learn	0.966		
P6_Records my learning progress and performance	0.894		
P3_Recommends the most suited pathway for my learning	0.856		
P5_Enables me to track my learning progress	0.845		
P9_LeaP was effective in personalizing my study for the Mid-Semester Test.	0.829		
P10_LeaP was effective in personalizing my learning on Marketing Fundamental topics	0.822		
P2_Provides me the flexibility to complete my learning	0.770		
P7_Has a positive impact on my learning	0.769		
P8_I enjoy learning using LeaP content packages	0.768		
P1_Provides me with multiple opportunities to bridge my learning gaps	0.764		
L3_Provides sufficient content	0.716		
L5_Enables me to learn the content I need	0.678		-0.309
L6_Supports my learning	0.667		-0.302
L4_Provides useful content	0.629		-0.333
L2_Provides content exactly fits my need	0.612		-0.336
L1_Provides up-to-date content	0.476		-0.429
M2_Little or no functional differences between the mobile and desktop devices		0.826	
M1_Easy access using mobile devices		0.777	
S2_User-friendly			-0.851
S1_Easy to use			-0.787
S4_Instructions are clear			-0.787
S3_Easy access to content and learning packages			-0.681
S5_Lesson goals are clear	0.380		-0.543

Figure 1: Pattern matrix

Factor 1 includes variables related to the effectiveness and flexibility of the LeaP learning platform. The high loadings on Factor 1 (P1-P10, L3) suggest that learners perceive LeaP as an effective and flexible platform for their learning. Factor 2 (M1-M2) includes variables related to the ease of access to LeaP using mobile devices. Factor 3 (L1-L2, L4-L6, S1-S5) includes variables related to the usability and clarity of instructions. Based on the theory behind the constructs and the content of the item, the L-items are more conceptually related to Factor 3 which may be more meaningful to be grouped with the S-construct, along with S5. S3, having a higher absolute loading for Factor 3, is decided to be grouped in the S-construct. Two reliability tests are run with one excluding L5 and L6 and the other including L5 and L6 to decide if L5 and L5 are invalid items that do not contribute much to the interpretation of factors. The Cronbach Alpha values are above 0.9 for all constructs for all the 2 runs should suggest very good internal consistency reliability for the sale in this sample. But based on Pallant (2000), the constructs have a small number of items (e.g. less than 10), the Cronbach alpha value may not be reliable. The mean inter-item correlation value is suggested.

There is a slight regrouping of the items into 3 factors. (S) and (L) are combined to become Usability and Clarity (U). Personalization (P) included L3 and Mobile Devices (M) remain unchanged. Reliability Run 1 test was conducted for the 21 items excluding L5 and L6 and Reliability Run 2 test was conducted including L5 and L6. The mean inter-item correlation values from Run 2 improved for (U) only. This may be an indicator not to exclude L5 and L6. L5 and L6 are included for all further analysis.

Run 1: 3-factors (21 items – excluding L5 and L6)			
Construct	No. of items	Inter-item Correlations	Cronbach Alpha
(U) Usability and Clarity [S+L]	8	0.667	0.941
(P) Personalization [+L3]	11	0.683	0.959
(M) Mobile Devices	2	0.747	0.855
Run 2: 3-factors (23 items – including L5 and L6)			
Construct	No. of items	Inter-item Correlations	Cronbach Alpha
(U) Usability and Clarity [S+L]	10	0.679	0.955
(P) Personalization [+L3]	11	0.683	0.959
(M) Mobile Devices	2	0.747	0.855
Run 3: Preliminary 4-factors (23 items – including L5 and L6)			
Construct	No. of items	Inter-item Correlations	Cronbach Alpha
(S) System User Interface	5	0.725	0.909
(L) Lesson Content	6	0.718	0.941
(P) Personalization	10	0.695	0.953
(M) Mobile Devices	2	0.748	0.855

Figure 2: Reliability tests

Run 3 was done on the preliminary 4 constructs using all 23-items in their initial grouping to confirm our hunch that that the preliminary grouping would be more advantageous. The improvement in the mean inter-item correlation values for all factors suggested that the items within these factors are measuring the intended construct in a consistent and reliable manner. Hence the researchers made the decision to fit a 4-factor model for all further analysis, with S5 grouped under L-construct using the results of the pattern matrix for the preliminary 4 constructs as they felt that S5 would land itself better to the L-construct based on its' item description. This grouping will be used for further analysis. Establishing content validity is essential to ensure construct validity. Notably, after conducting factor analysis tests, the 4-factor model appears to be more suitable, aligning with the constructs confirmed in the studies conducted by Lim, et al. (2022) and Zhang, et al. (2022) as shown in Table 3. The constructs and items underwent review by a panel consisting of LeaP administrators and piloted subject teams, ensuring the refinements before the survey was released. Kruskal-Wallis, Friedman test and Kendall's tau correlation coefficient are used to examine the differences between satisfaction and the relationship between satisfaction and engagement level based on the normalized sum of each of the 4 constructs (O'Rourke et al., 2019).

Item Code and Description											Adapted from
S1	S2	L1	L2	L3	L4	L5	L6	P3	P4	P6	Lim, et al. (2022)
S5	P1	P2									Zhang, et al. (2022)

Table 3: Question design

Initially, a mixed between-within subjects ANOVA is used to analyze both between subject grouping (Subject A, Subject B and Subject C) and within subjects' satisfaction ((S) containing S1-S4, (L) containing L1-L6+S5, (P) containing P1-P10 and (M) containing M1-M2) can be done using one analysis. Although the assumption of homogeneity of variances is not violated (by Levene's Test), but the Box's Test of Equality of Covariance Matrices assumption is violated due to unequal sample sizes across different subjects. Non-parametric Kruskal-Wallis and Friedman tests are deemed more appropriate instead.

Normalized Construct	Subject	Mean	Median	Std. Dev	Construct Mean	Construct Median	Construct Std. Dev	Mean Rank	Asym. Sig
(S) Construct	Subject A	3.7677	3.73	0.78226	3.744	3.78	0.80302	246.75	0.121
	Subject B	3.6323	3.73	0.86675				226.88	
	Subject C	3.9561	4.00	0.68563				277.42	
(L) Construct	Subject A	3.8625	3.97	0.76679	3.7969	3.905	0.78879	254.80	0.013
	Subject B	3.6167	3.68	0.83413				213.26	
	Subject C	3.8983	4.00	0.71320				257.99	
(P) Construct	Subject A	3.8130	3.89	0.76672	3.7435	3.82	0.77485	254.08	0.017
	Subject B	3.5561	3.51	0.78756				214.30	
	Subject C	3.8389	4.00	0.69481				260.44	
(M) Construct	Subject A	3.3992	3.00	0.96110	3.3748	3.00	.	246.90	0.001
	Subject B	3.1956	3.00	0.94084			0.95496	217.25	
	Subject C	3.8333	4.00	0.78457				312.19	

Figure 3: Descriptive Statistics & Kruskal-Wallis results

Using the Kruskal-Wallis test as shown in Figure3, there are significant differences in the ratings of the three subjects between the constructs (L), (P) and (M) with alpha less than 0.05. There is no significant difference in the ratings for construct (S) across the three subjects. Different subject learners do not rate (S) construct differently. As LeaP is an integrated tool in the LMS, students had similar levels of familiarity and experience with the LMS user interface, which affects their perception of the system user interface in LeaP. The design and usability of the LeaP are consistent across subjects, leading to similar perceived satisfaction across the board.

Subject B gave the lowest ratings for all constructs. Their cohort size is relatively huge and only one LeaP package was implemented as supplementary material for revision in preparation for the Term Test. The poor ratings may be attributed to a lack of LeaP exposure and poor communication at the beginning of the semester. Additionally, the independent sample test showed that learners from Subject A and Subject B rated the (L) construct differently. This is arguable as Subject A has launched 6 LeaP supplementary packages throughout the semester and learners have a higher degree of familiarity with the tool.

Subject C has the highest mean rank and highest median across all 4 constructs. Subject A and Subject B are introduced to LeaP at the start of the semester. As Subject A and Subject B are using LeaP as supplementary material for the first time, they may face some unfamiliarity and are the first to encounter any obstacles from using the PAL. Moreover, Subject C commenced using LeaP about two weeks after other subjects, and had the smallest cohort, making communication and control more manageable. Furthermore, as a result, they could have benefited from the prior issues experienced by Subject A and Subject B. By then, most technical difficulties had been resolved, and the introductory briefing was more streamlined, allowing learners to establish their own expectations for the tool. So, it's understandable that Subject C has the best perceived satisfaction level across all 4 constructs.

Construct (M) has the lowest median scale across all subjects. Subject B has the lowest median scale for constructs (L) and (P). These could be the area of foci for better user experience. Recommendations on these will be discussed in the next section.

Normalised Weighted	Mean Rank	Chi-Square	df	Asymp. Sig.
(S) Construct	2.53			
(L) Construct	2.68	136.871	3	0.000
(P) Construct	2.80			
(M) Construct	1.99			

Table 4: Friedman Test

From the Friedman Test shown in Table 4, there is a significant difference between all constructs. The students' ratings of the four different constructs are significantly different from each other. It is possible that the students have different preferences for learning styles and approaches, which may affect their perceptions of the usefulness and effectiveness of PAL. Additionally, the students may have different levels of prior knowledge and experience in the subject area, which could affect their engagement with and perceived satisfaction level of PAL. Other factors such as technological proficiency, motivation, and cognitive ability could also contribute to the differences in the students' ratings.

Using the Kendall's tau non-parametric correlation coefficient (Table 5), all four correlations ranged from 0.044 to 0.102 showing positive correlation with the overall engagement level. All have a statistically significant p-value less than 0.05 except for (M), which indicates that the likelihood of these correlations being a result of chance is low. The 3 factors (S), (L) and (P) have a significance level of less than 0.05, indicating that their correlation with overall engagement level is statistically significant, except for the (M) factor. These results can provide useful insights to guide future efforts aimed at enhancing engagement levels. The findings suggest that improving the (S), (L) and (P) factors could be key foci to have a positive impact on learner engagement level, while the use (M) factor may not have a significant influence on engagement.

| | | Normalised Weighted Sum of | | | |
		System User Interface (S)	Lesson Content (L)	Personalization (P)	Mobile Devices (M)
Overall Engagement Level	Correlation coefficient	0.102	0.065	0.093	0.044
	Sig. (2 tailed)	0.002	0.044	0.004	0.193

Table 5: Kendall's tau correlation coefficient

Conclusion and Recommendations

Based on the qualitative feedback, learners have varying levels of understanding about the benefits and functionality of PAL, which resulted in some learners being hesitant to try out the new AI-enabled self-study tool and prefer to revise the subject on their own. This presents an opportunity for school administrators and educators to come together and develop a shared playbook or detailed introduction to PAL for the learners to be familiar with the system user interface, lesson content and self-tracking reports to monitor learners' performance. Educators can reflect on their pedagogical strategies and adapt them to learners' needs by promoting the use of PAL. By considering the unique nature of the subjects and students with different levels of prior knowledge and experience in the subject area, we can create a scaffolding approach that will increase awareness, enhance motivation, and provide greater clarity on the use of this innovative tool. Effective communication is often considered the first and most critical step towards successful implementation which could be in the form of an engaging introductory video or a live demonstration shown at the beginning of each course. Clear and easy-to-follow step-by-step guide should be available for troubleshooting any common technical issues that may arise. Working collaboratively to develop a shared vision and detailed understanding of PAL and its benefits can ensure a positive and successful experience for all learners.

Although LeaP is an off-the-shelf product integrated into the LMS, we can still work towards improving the usability of the tool to improve the overall user experience. A well-designed

user interface and personalized learning content can increase learners' interest and engagement, leading to higher participation in the learning process (Thanyaluck et al., 2022). Our findings can be shared with the vendor as valuable customer feedback and we can collaborate with them to propose enhancements to the system user interface and the organization of LeaP content, making LeaP more user-friendly and beneficial for both learners and teaching staff.

The educational benefits and technological impact of personalized adaptive learning are highlighted in studies by Costa et al. (2021), Taylor et.al. (2021) and Murray et al. (2015). We believe that teaching staff can take advantage of personalized adaptive learning to plan the course delivery more efficiently and re-organise the learning resources into smaller portions to allow LeaP to recommend study paths more effectively. This will help to optimise the use of teaching resources, saving time and reducing the workload of teaching staff, while reducing the need for repetitive remedial and consultation sessions. LeaP can also be a valuable tool for assessment revisions. As successful learners share their experiences through word of mouth, this can create a positive ripple effect and inspire others to adopt this innovative approach to learning. By harnessing the capabilities of AI and embracing personalized adaptive learning, we can revolutionize the field of education and ultimately achieve greater success in education.

Limitations of Research

While our study highlights the importance of improving the usability and clarity of learning materials to increase learner engagement, we recognize that the findings may not be generalizable to other subject areas. However, we believe that our research provides a valuable foundation for future investigations. Despite our sample size being large enough for qualitative research, the findings are analyzed based on self-reported data using a questionnaire. Though efforts are made to validate and ensure the reliability of the data collection instrument, we acknowledge that the data may have an inherent bias due to the representation of a specific group of learners with its own characteristics which may not be representative of the population. We encourage further research on larger and more diverse groups of LeaP learners to gain additional insights and improve the generalizability of our findings. By building upon our study, we hope to enhance the quality of education and create a more positive and engaging learning experience for all students.

Acknowledgements

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An AI-Enabled Learning System With Personalized Learning Pathways a Pilot Study of Its Impact on Learning of Statistics

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Abstract

AI-enabled systems offering personalized learning pathways or options are gaining imminence, showing immense potential to meet diverse learners' needs on a more practical scale. In this work, we piloted a learning resource that offers personalized learning pathways (or LeaP), powered by AI technology. The efficacy of the learning tool was evaluated using a skills test in a freshman statistics course. The results largely replicated what was found in the literature. For learners who used the resource, levels of engagement were not dependent on prior ability measured by past-semester GPA performance. The greatest difference in test scores was seen in the test task which the LeaP unit modelled after, with significant differences between learners who engaged with LeaP deeply versus those who did not attempt the unit at all. At-risk learners had poorer engagement levels and test performance compared to non-at-risk peers, which warrants a closer look at how intelligent tutoring systems (ITS) should be designed to meet their needs in online learning environments. Suggestions for future implementation and research were also proposed.

Keywords: Artificial Intelligence (AI), Applied Computing, Foundation Statistics, Human-Computer Interface, Interactive Learning Environment, Intelligent Tutoring Systems, Personalized Learning Pathways

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1.   Introduction

The COVID-19 pandemic has left an indelible mark on the delivery of traditional education on a global scale. The rapid rise of Artificial Intelligence (AI) technology is gaining traction in the delivery of a personalized learning experience that adapts to the specific needs of the learners (Pantelimon et al., 2021). Its broad application in educational settings has also been driven by technological advances, resulting in improved productivity and efficiency (Chassignol et al., 2018).

1.1   ITS and AI

Intelligent tutoring systems (ITS) and AI are the two key pillars that support just-in-time, adaptive learning in an online learning space. ITS can be seen as an antecedent to AI technology; both aim to inform instructors of learners' behaviors and interactions in an online learning environment. As described by Freedman et al. (2000), ITS is a computer system that provides personalized instruction and feedback without the intervention of a human tutor. ITS is a powerful educational tool that can be customized and integrated into learning systems and relies on computer programming to enhance the learning experience with tailored lessons. With the advent of technology, ITS has evolved from the traditional, rigid computer-aided instruction models associated with hard-coded links and has been under development for decades as Graesser et al. (2018) noted in their research. With ITS, customized instruction may be delivered to diverse learners at scale, achieving the benefits and effects of one-on-one coaching to improve academic performance (Bloom, 1984).

AI can be seen as the undergirding technology to augment ITS functions. Unlike ITS, where the learning paths are more or less hard-coded and static, AI revs up the backend technology to enhance the linkage and communication between the learner and the learning content by optimizing the four main components of the learning system: the domain knowledge, learner's current knowledge level, pedagogical or instructional measures (such as assessment) and the user interface (Pappas & Drigas, 2016; Pipitone et al., 2012). The integration and synchronization of these components is the cornerstone of AI-enabled tutoring systems and is pivotal in delivering customized instruction to meet diverse learners' needs.

1.2   Learning Outcomes and Engagement in Adaptive Learning Environments

ITS, whether AI-enabled or otherwise, have been experimented with in the teaching and learning of STEM subjects such as mathematics (Bang et al., 2023; Bartelet et al., 2016; Beal et al., 2010; Eryılmaz & Adabashi, 2020) and even in non-STEM domains such as sports and dance or in business courses (Ashwin et al., 2023; White, 2020). Positive learning outcomes were noted in terms of improvement in assessment scores or user satisfaction levels (Bang et al., 2023; Bartelet et al., 2016; Beal et al., 2010, Eryılmaz & Adabashi, 2020; White, 2020).

For at-risk learners, defined as those with poor academic performance and more likely to drop out of the course (Repetto, 2018, p. 163), an online learning environment seemingly affords a higher level of learner autonomy, control, and pace to their advantage. With AI-enabled self-study tools, some work reported positive outcomes with low attainment students. For example, Bang et al. (2023) reported that the use of an adaptive learning app for mathematics produced the greatest learning gains in assessment tasks for learners from at-risk socio-economic groups. Bartelet et al. (2016) also reported their mathematics ITS optional homework tool produced pre-post gains in all levels of learning ability, with the low

attainment learners benefitting more compared to the middle and high-level learners. The effects of more practice in the ITS environment (or interaction) on test gains were seen mainly in easier homework topics. Similar, Beal et al. (2010) found that learning gains were the most prominent in learners with the weakest initial mathematics aptitude, and learners who did more ITS sessions improved more than learners who accessed less of it.

1.3   Research Questions

Against the research, the current study aims to answer the following research questions (RQs):

1. What are the differences, if any, in learner engagement of an AI-enabled tool that offers personalized learning pathways (thereafter called LeaP), amongst learners of varying aptitudes in a freshman statistics course?
2. What is the impact of learner engagement in the LeaP tool on a statistics skills test?
3. How did the academically challenged (or at-risk) learners engage with the tool and what was the impact on the skills test?

2.   Method

2.1   Participants and Lesson Deployment

The LeaP lesson unit was implemented in the fall semester of a foundational statistics course in October 2022. It was used as a revision package prior to a skills-based assessment, which required learners to compute and interpret various regression coefficient estimates using Excel data-analysis tool pack or the R software. The unit was embedded in a learning management system (LMS) and was accessible to learners in the second week of November, leading up to the assessment in the third week. The unit remained available until the mid-semester term test as it was expected that some learners might use the tool for term test revision. To evaluate the impact of the tool, we removed late attempts submitted after the skills assessment week. The sample size decreased from an initial enrolment level of 484 to 357 learners (see the section on "Variables and data analysis"). No ethics approval was needed as the unit was presented to all learners as a learning resource.

2.2   Configuration of the LeaP Unit

LeaP is an off-the-shelf adaptive learning tool that is integrated within the LMS. It has three main components: a mapping engine, a ranking engine and a recommendation engine. The mapping engine receives content assets and resources such as learning outcomes, learning materials (lecture notes in word or presentation files, video lectures), question pool and learner's quiz results. The instructor needs to set up a .csv file format to capture the learning outcomes and question pool in pure text format, while ensuring a tight semantic association with the learning materials presented in the LMS. The backend semantic algorithm then ranks the extent of relatedness or relevancy between all the input assets. Lastly, the recommendation engine would combine the content relevancy and learners' quiz performance to propose the most optimal materials to close learning gaps. LeaP is adaptive in nature as content relevancy would change each time a learner repeats a test question, ensuring that already-learned materials are not recommended.

The LeaP lesson pathway as experienced by the learner is summarized in Figure 1. Figures 3 to 6 display the learner view in the LMS interface at various stages of the learning pathway.
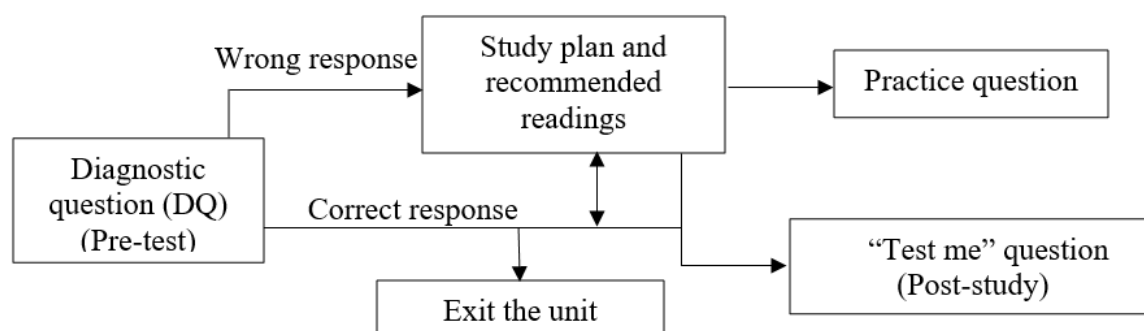
Figure 1: The learning journey in LeaP.

The test bank for the diagnostic question (DQ), practice and post-study questions consisted of 20 MCQs based on raw data from four datasets. Questions in the test bank mirrored the actual test task. The interface randomly presents one MCQ each time the learning unit is launched, whether at the DQ, practice question or post-study stage (a maximum of three DQs could be posed for a higher workload). The trigger to the recommended learning pathway is learner's performance on the DQ, taken as an indication if the learning outcome was achieved. All interaction buttons are displayed within the same browser window so that the learner has full control in the whole process, whether to continue with the recommended resources, or proceed to take a practice or post-test question. A "thumbs up" or "thumbs down" button is also available for learners to recommend a learning resource depending on the perceived utility. This allows the AI backend to adjust the relevancy of the material. An example of a DQ is shown in Figure 2. Feedback is shown upon answer submission.

> Download the "Student grades" dataset. Using Excel or R/R-studio, (i) Determine the equation of the multiple linear regression trend line to predict English marks from Writing and Reading marks. (ii) What is the R^2 value? (iii) What does R^2 tell you?

Figure 2: Example of a DQ.

Figure 3: The initial landing page with the DQ or pre-test question.

Figure 4: Correct response to the DQ, with the option to exit or continue with study.
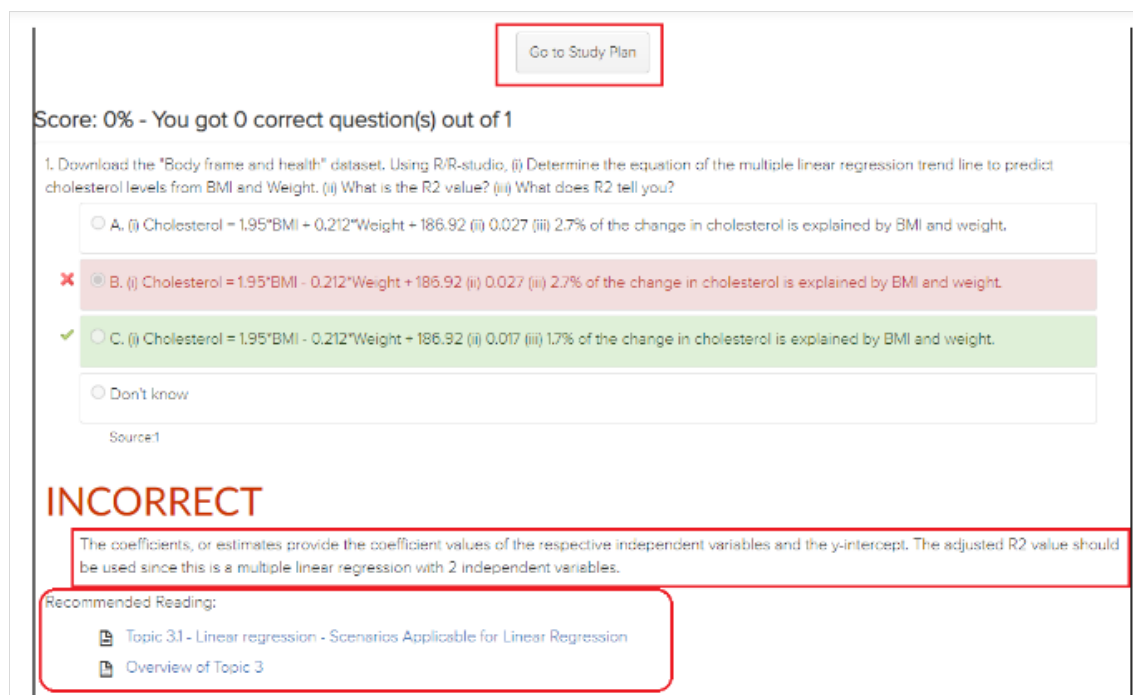
Figure 5: Incorrect response to the DQ with feedback, recommended revision resources.
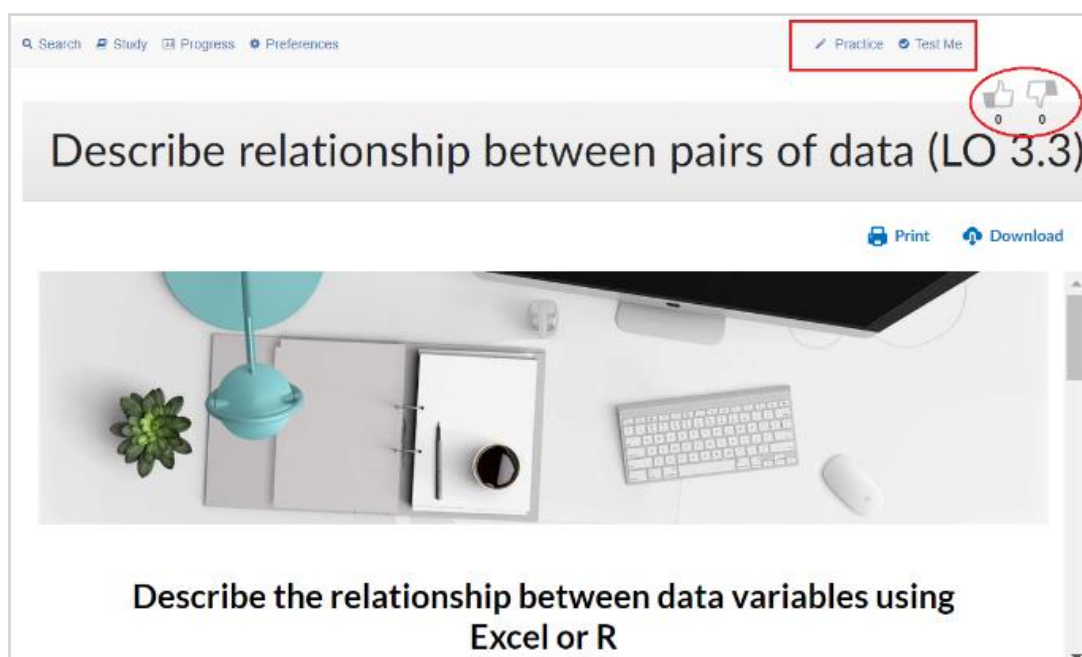
Figure 6: A study path in-progress, with the marked-out boxes showing the "thumbs-up/thumbs-down" buttons, practice and post-test question.

2.3 Variables and Data Analysis

The learner interaction data and the scores of the skills test were downloaded from the LMS. The number of trials or attempts in the pre-test, post-test and practice-test questions was used to define the LeaP engagement levels, as shown in Table 1.

Level	Description
0	Did not do the LeaP lesson at all
1	At least one attempt on pre-test but no post-test and practice question
2	At least one attempt each of pre-test and practice test but no post-test
3	At least one attempt each of pre-test and post-test but no practice test
4	At least one attempt each of pre-test, post-test and practice test

Table 1: Levels of LeaP engagement.

Prior ability was operationalized as previous semester GPA, with a maximum possible best of 4.0. The skills test comprised three questions out of a total of 20 points with one question similar to the LeaP pool. The other two questions tested concepts related to normality tests and correlation analysis. The scores were re-based to a total of 100%. Upon removing late LeaP attempts submitted after the skills test, we obtained a total of sample size of 357 learners (223 LeaP submissions and 134 non-attempts). There were 15 students who repeated the course, whose GPAs were unknown and thus excluded from GPA analysis where needed. The repeat learners were included in the academically-challenged pool for RQ3. SPSS Version 26 was used for all data analysis.

As the test scores (dependent variable) were non-normal, non-parametric tests such as the Kruskal-Wallis H-test and chi-square test were used for group differences. GPA was segregated into three levels, Low (0 to ≤2), Mid (2 to ≤3) and High (3 to ≤4). Where the assumption of a minimum expected cell counts of 5 was not fully met, the likelihood ratio was used as the chi-square statistic (Field, 2013, p. 724). The default significance level of .05 was used, except when multiple comparisons were made to illuminate paired differences. Effect sizes for paired comparison is calculated by dividing the standardized Z-statistic by the square root of the total sample size (Pallant, 2016, p. 233).

3.   Results

3.1   Relationship Between LeaP Engagement and GPA Levels

Table 2 shows the GPA bands distributed across the engagement levels, excluding the 15 repeat learners. GPA percentages in each level of engagement is shown in Figure 4.

GPA	Level 0	Level 1	Level 2	Level 3	Level 4	Total
Low	19	2	0	3	1	**25**
Mid	60	13	7	22	8	**110**
High	46	26	13	91	31	**207**
Total	**125**	**41**	**20**	**116**	**40**	**342**

Table 2: Levels of LeaP engagement and GPA

A chi-square analysis revealed a significant relationship in the levels of engagement and GPA levels ($\chi2$ (8, 342) = 56.9, p = .00). As shown in Figure 7, the proportion of learners in the Low and Mid GPA bands decreased as LeaP engagement levels increased. The Cramér's V value was .28, corresponding to a moderate effect size (Cramér's V, n.d.). If the no-LeaP learners were excluded, the chi-square analysis did not show a significant relationship between LeaP engagement levels and GPA ($\chi2$ (6, 217) = 6.24, p = .40).
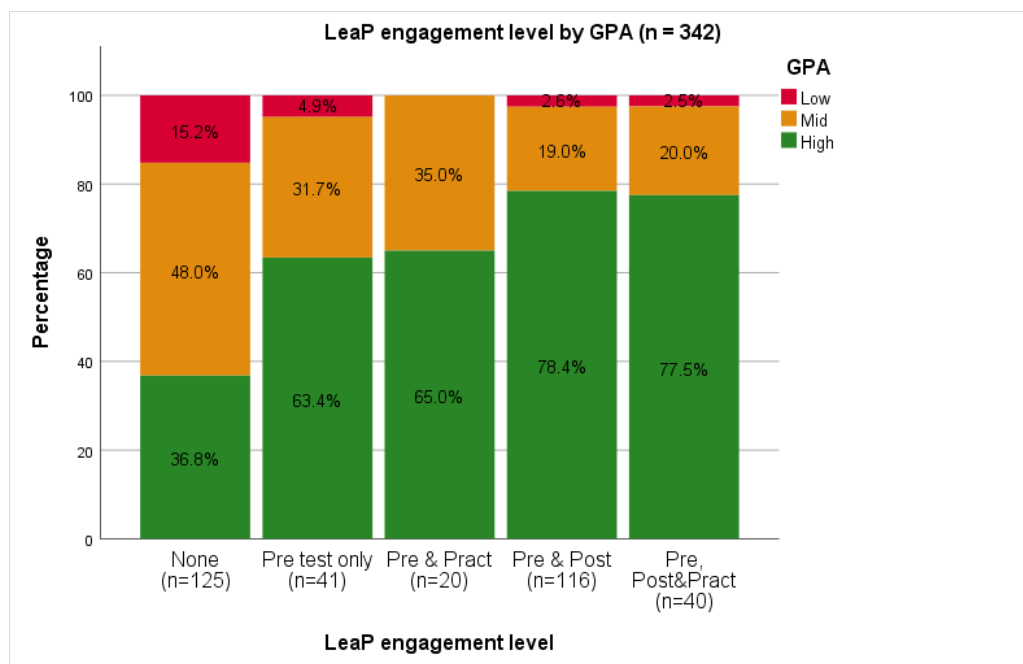
Figure 7: The proportion of GPA in each engagement level.

3.2 Impact of LeaP Engagement on Test Scores

Table 3 shows the mean, median, standard deviation and the Kruskal-Wallis H-test statistic of scores for each test question by engagement levels. As the level of engagement deepens, the score in Question 3 (which the LeaP unit models after) increased.

	0 (None)		1 (Pre-test only)		2 (Pre and Practice)		3 (Pre and Post-test)		4 (Pre, Post and Practice)		Kruskal-Wallis χ^2 (4,357)
	M (SD)	Md	M (SD)	Md	M (SD)	Md	M (SD)	Md	M (SD)	Md	p-value
Q1	45.58 (38.83)	50	45.64 (37.42)	50	60.83 (32.23)	66.67	64.41 (36.29)	70.83	64.43 (36.61)	83.33	23.36 .000
Q2	38.06 (38.50)	50	50.57 (37.54)	50	62.50 (35.82)	50	64.30 (38.23)	50	67.07 (33.74)	50	35.31 .000
Q3	28.21 (31.47)	20	46.36 (34.96)	45	53.25 (39.94)	65	67.58 (28.52)	70	79.15 (22.10)	85	96.78 .000

Table 3: Descriptive statistics of test scores by question.
M=mean (standard deviation in brackets), Md = Median.

Figures 8 to 10 show boxplots of test scores in each question by engagement levels. As 10 pair comparisons were made, a more stringent criterion value of .005 (0.05 ÷ 10) was used. Based on this adjusted significance level, only Level 0 and 3 (none-versus-pre and post-group) had a significant difference in question 1. For question 2, besides Level 0 and 3, another pair produced significant differences in scores: the Level 0 and 4 (none-versus-pre, practice and post-test group). For question 3, the number of pairs with significant differences increased to three: Level 0 and 3 (none-versus-pre and post group), Level 0 and 4 (none-versus-pre, practice and post-test group) and Level 1 and 4 (pre-versus-pre, practice and post-test group). The effect sizes for the significant pair difference are presented in Table 4.

Question	Significant pair differences	Standard test statistic (*Z*)	Effect size
Q1	Level 0 and 3	-4.13	.22
Q2	Level 0 and 3	-5.24	.28
	Level 0 and 4	-4.13	.22
Q3	Level 0 and 3	-8.19	.43
	Level 0 and 4	-7.79	.41
	Level 1 and 4	-4.11	.22

Table 4: The effect sizes for significant pair differences per question. The effect size is calculated using the formula $Z/\sqrt{n}$, where n = 357 (Pallant, 2016, p. 233).
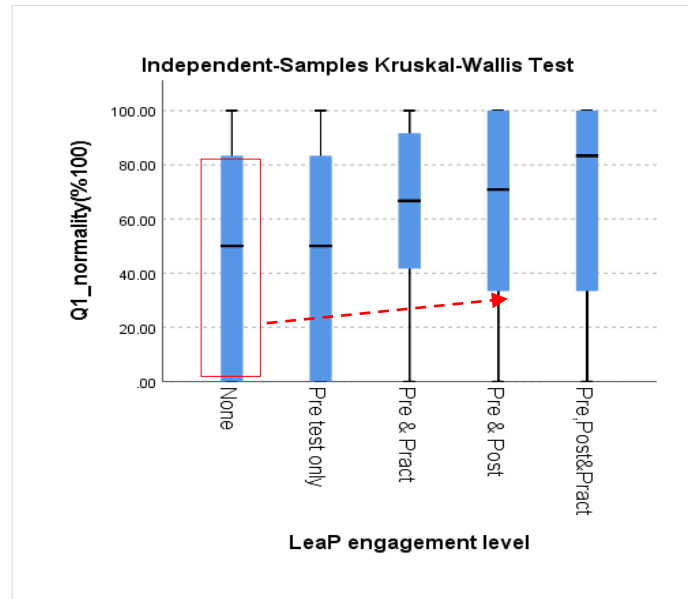
Figure 8: Boxplot for Excel test question 1. The dotted arrow represents significant differences between engagement levels. p-value = .000, adjusted for multiple comparisons.
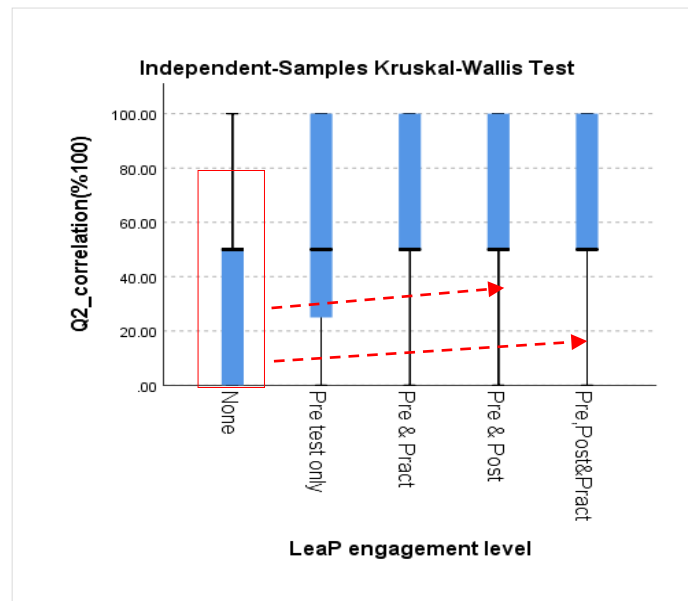
Figure 9: Boxplot for Excel test question 2. The dotted arrow represents significant differences between engagement levels. p-value = .000, adjusted for multiple comparisons.
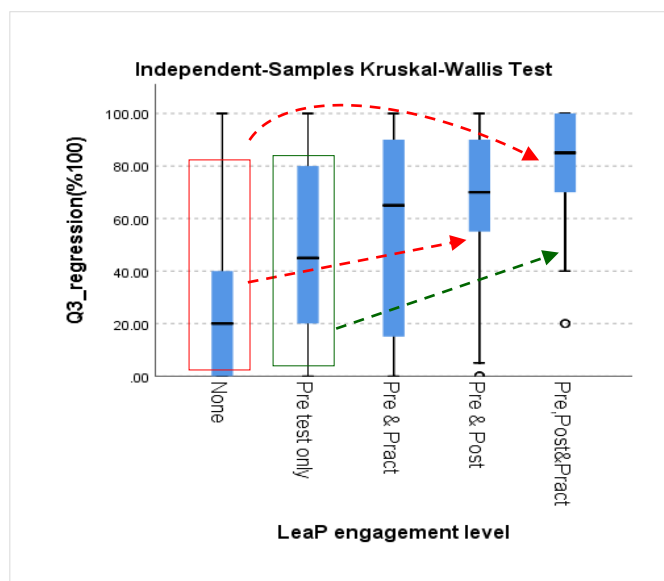
Figure 10: Boxplot for Excel test question 3. The dotted arrow represents significant differences between engagement levels. p-value = .000, adjusted for multiple comparisons.

3.3   LeaP Engagement of Academically Challenged Learners and Test Scores

For this analysis, the 15 learners (with missing GPA data) who repeated the course and the current-cohort learners with a GPA of 2 points or less were defined as at-risk. This formed a total pool of 40 at-risk learners, and 317 learners not at-risk. Table 5 summarizes the engagement counts between these two groups of learners and the mean, standard deviation and median scores. There is a significant relationship between academic status and engagement level, χ^2 (4, 357) = 25.4, p = .00. The Cramér's V effect size was .251. At-risk learners also performed significantly lower than their non-at-risk peers across all the three questions. For question 1, the Mann-Whitney U-statistic was 4,695 (Z = -2.72), p-value = .007. For question 2, U = 4,417 (Z = -3.28), p-value = .001 and for question 3, U = 3,278 (Z = -5.01), p-value = .000. As seen in Figure 11, there is a high proportion of at-risk learners who did not use the LeaP lesson unit to prepare for the skills test. Very few at-risk learners accomplished Level 4 engagement.

GPA	Level 0	Level 1	Level 2	Level 3	Level 4	Total	Q1		Q2		Q3	
							M (SD)	Md	M (SD)	Md	M (SD)	Md
Not at-risk	106	39	20	113	39	**317**	56.76 (37.66)	58.33	55.40 (38.63)	50.00	54.05 (35.27)	60.00
At-risk	28	5	0	5	2	**40**	39.58 (39.03)	37.50	33.75 (41.04)	0.00	24.25 (32.14)	5.00
Total	**134**	**44**	**20**	**118**	**41**	**357**						

Table 5: LeaP engagement levels and at-risk status and descriptive statistics by test question.
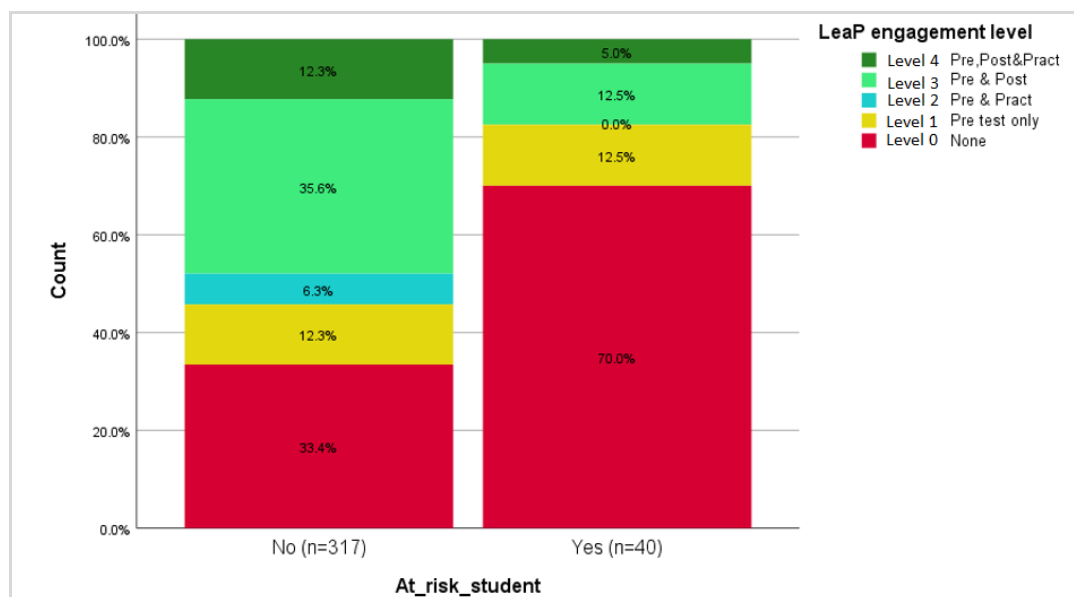
Figure 11: proportion of engagement level between the at-risk and not at-risk learners.

4.   Discussion

Our first RQ was to ascertain if there is a relationship between GPA and LeaP engagement level. The results showed that about 64% of the cohort (217 learners cumulated from Level 1 to 4) had at least attempted the DQ. Amongst the 36.5% of learners who did not use the resource, about 63% of them had a GPA track record of lower than 3 points (Low and Mid categories combined), about 37% of the non-submitters being learners with a high GPA track record of 3 points and above. In contrast, for learners who at least use some LeaP, the proportion of strong-GPA attainment was much higher, reaching a maximum of 78.4% for level 3 learners with a GPA track record of at least 3 or better (see Figure 4). However, when the non-submitters are excluded, the amount of effort exerted did not differ by GPA track record, thus answering the first research question.

The results also pointed to a polarization of test performance between the non-submitters and deeply engaged LeaP learner. For question 3, the task modelled after the actual assessment question, learners who did not access LeaP at all were worse off than learners who practiced the unit beyond just doing the DQ or pre-test. In fact, the largest effect sizes in the range of approximately 0.4 were observed in question 3 between the non-doers and those learners who diligently completed the pre-test, practice, or post-test. This illuminated the second research aim in that the more conscientious LeaP learners gained better outcomes. It is important to note that low GPA learners would also benefit if they spend effort and time to use the LeaP unit. Taken altogether, the results confirmed the evidence obtained in past studies (Bartelet et al., 2016; Beal et al., 2010; Eryılmaz & Adabashi, 2020), in that practicing tasks in an ITS or a learning environment that offers personalized learning routes has alleviating effects on academic performance. Low attainment learners also benefit if they choose to engage with the resource.

The differences in engagement became very pronounced when at-risk learners were compared to non-at-risk learners. Not only did the at-risk learners performed poorly in all the three questions, a large proportion of at them (70%) did not use the LeaP tool at all, as compared to about a third of the non-at-risk students who likewise did not access LeaP. The proportion of learners engaged in deeper learning for the at-risk group was also very much

lower than the corresponding levels for the non-at-risk group. There are two possible reasons for the poor levels of engagement exhibited by the at-risk learners. Firstly, due to the relatively short window of exposure (1 week), there was insufficient time for instructors to engage with learners, particularly the at-risk group (who might perhaps need more handholding and probing), to explain or communicate more clearly the goal of this instructional package. Secondly, there could be other needs troubling at-risk learners, such as family problems (Repetto, 2018, p. 165) that simply cannot be resolved by any well-intended online learning resource or system. Therefore, more work is required to understand how to support at-risk learners in a technology-based online learning space for our institutional context.

Although our study showed that learners with low GPA but engaged sufficiently with LeaP could still potentially benefit, we could not confirm any pre-post learning gains differentiated by prior ability as evidenced in the literature. This is because our outcome measure focused on a single assessment, rather than the change in score between the DQ and post-study question in the LeaP environment. While the system does generate scores on all question types, we did not choose to analyze differences because the learning scope of the LeaP module was rather narrow. Pre-post gains would be more meaningful when the environment is enriched with more content, tasks and highly varied learning pathways. Another limitation is that it could well be the case that learners simply skipped the recommended learning pathways or study plan and jumped directly to the practice or post-test questions. In other words, the better test performance may just be an effect of repeat practice, rather than a repeat study effect. Again, while the LeaP system could generate behavioral and interaction data (for example, the number of views of the recommended reading resources or study path), analyzing such data would be more meaningful with a larger content scope. However, in the light of learner choice and autonomy within a learning space offering personalized learning options, the issue of bypassing the recommended study plan may not be detrimental to learning. Akin to Bartelet et al. (2016), pre-post analysis and content engagement data could shed light on the choices and behaviors of all learners across a range of topics, including those at-risk. This could be a scope for future research.

Despite the limitations, both learners and instructors have benefitted from this simple pilot implementation. This is because classroom time was very limited, and instructors typically have very little or just no time to do revision or practice with students in class before an assessment. Based on the statistics generated by the system, we estimated that each learner spent between 1 to 2 hours self-studying the LeaP module. If we multiply this amount of time by about 500 learners, it is immediately apparent that one-on-one personalized coaching by human instructors within curriculum time is simply impractical and infeasible. We also questioned whether we could substitute the LeaP module with revision question sets or quizzes posted on the LMS, complete with automated feedback for learner's self-study. This is certainly possible, but the user interface would lack the feature that guides learners back to the lecture materials to review the concepts they faulted on. LeaP offers a more integrated interface and the advantage of recommending appropriate lesson contents to learners immediately upon answering the DQ.

5.   Conclusion

In conclusion, our results replicated the main findings of previous research to support the learning efficacy of ITS or AI-enabled systems offering personalized learning options. The experience and lesson gained in this pilot trial have guided us in terms of optimizing and

configuring our content to ensure that learning pathways are aligned to match learners' as-at needs. We may say with much conviction that compared to human instructors, AI-enabled personalized learning systems possess outstanding features that enable the scale-up of individualized instruction to suit the needs of diverse learners. This removes the need for tedious and constant monitoring by human instructors. We are perhaps not far away from a utopian vision of delivering personalized education to learners with reasonable effort, as Bloom (1984) hoped for.

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Family Household Income and Children's English Proficiency in Malaysia: A Case Study

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Abstract

Malaysia is a diverse country where the population covers people with different races that results in most Malaysian being able to be either bilingual or multilingual. Although the differences is a common factor that might be influencing their English proficiency, yet many of the research that has been done to study the correlation of races and English proficiency prove that the relationship between those two is there. Most people tend to ignore the influence of household income towards their English proficiency which results in less research being conducted. Thus, this study aims to investigate the parents' experiences between family household income and children's English proficiency in Malaysia. A few interviews had been conducted to obtain the qualitative data from Malaysians with different family household income. This study reveals that there is a relationship between family household income and their children's English proficiency in terms of the level of awareness on the importance of English, the practice of English in daily life and the resources provided by parents.

Keywords: English Proficiency, Household Income, Awareness, Parents and Children, Malaysia

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Introduction

The purpose of this research is to study the relationship between various family household incomes and their children's English proficiency in Malaysia. The household income in Malaysia can be divided into three categories which are B40, M40 and T20 which differ based on the salary range of the household income. The Table 1 below serves a better understanding of the mentioned term.

Definition of Terms

Term	Definition
B40	Romelli (2022) mentioned that the bottom 40% of Malaysian household income is known as B40. They make less money each month than RM4,850.
M40	The M40, or Middle 40%, group represents Malaysia's middle class. According to the 2019 Household Income and Basic Amenities Survey, the average monthly income in Malaysia is between RM4,851 and RM10,970.
T20	According to Rebecca (2022), The T20 group represents the top 20% of household income in Malaysia. They are regarded as high earners because they make more than RM10,971 every month.

Table 1: Definition of B40, M40, and T20 in Malaysia's Household Income Classification

This study focuses on how the household income could affect or to not affect their children's English proficiency especially in Malaysia where English is not the primary language unlike other countries like the United Kingdom and Singapore that use English as their mother tongue. In Malaysia, there is a noticeable difference in children's English proficiency from different households. Children from the urban area have an excellent English proficiency compared to the children from the rural area which has poor English proficiency. Yet, the English proficiency does not rely on the locality of the children but the household income instead. Thus, the focus of this study is to find the correlation between household income and children's English proficiency in Malaysia and it is divided into three parts which are the parents' awareness on the importance of English language, the practice of English language in their daily life, and the resources provided by parents.

This research is being conducted due to the fact that there is a noticeable difference of English proficiency in children from different backgrounds in Malaysia. The obvious differences of their background is the household income of the parents of the children. As cited from Winsler (2014), it is frequently challenging to separate the influence of English proficiency against poverty in predicting early school results for DLLs because a large portion of DLLs live in poverty (Capps et al., 2005). (Goldenberg, Rueda, & August, 2006).

In their 2002 study of DLLs in Miami's kindergarten, second, and fifth grades, Oller and Eilers discovered that socioeconomic status (SES) was a more reliable predictor of English language and literacy skills than language spoken at home. There is a lot of research outside of Malaysia that has been discussing how financial household income could affect their children's English proficiency yet there is still limited research involving Malaysia on the very same topic. This is concerning as the English language is being used widely in Malaysia. Regional English is not viewed as a distorted form of the English language, but rather as a flexible variant that is feasible for efficient communication (Ong L. T., & Stephanie, 2018). This is the solid reason for the relevancy of this study involving the parents' household income and their children's English proficiency.

This research aims to investigate the differences of family household income and their awareness on the importance of English proficiency in Malaysia, to explore the English proficiency of children from various financial backgrounds and to identify the effect of family household income and its relevance in influencing the children's English proficiency.

Literature Review

Parents' Awareness on the Importance of English Language

The English language in Malaysia is considered as the second language that has been widely used after Bahasa Melayu since Bahasa Melayu is considered as the national language. Most Malaysians have the capability to speak English fluently despite their different race that has their own mother tongue. According to a research that has been cited, Malaysia was recently classified as having the greatest level of English proficiency among Asian nations where English is not the native tongue (NST 7, April 2011; referenced in Thirusanku & Melor, 2012, p. 11). Malaysia came out on top, followed by Hong Kong, South Korea, Japan, and the EF EPI (Education First, English Proficiency Index), a global education center that specializes in academic degrees, educational travel, cultural interaction, and language instruction. Five competency levels—very high, high, moderate, low, and very low—were assigned to the Asian nations. According to the survey, which was published on March 30, Malaysia was the only Asian nation to be evaluated as having a high level of English proficiency. In regard to this, the main contributor of fluency is mostly from the parents themselves who have been encouraging their children to be able to have a good English proficiency. Majority of parents in Malaysia are fully aware of the importance of English language proficiency yet not the majority is taking it into practice in their real life and solely rely on their teachers at school. English Language Education in Malaysia: Challenges and Strategies, a 2016 study by Rabea Malik and Noraini Idris, found that despite parents' awareness of the value of English for their children's education and future employment, access to resources and high-quality English language instruction was still problematic. In order to assist English language development, the study also emphasized the need for improved communication and teamwork between parents, teachers, and schools.

The Practice of English Language in Daily Life

The usage of English language in children's daily life in Malaysia is varied as there are many factors that might be influencing them. Even the level of English proficiency of each child might differ from time to time. There is a probability that any factors could be affecting children's English proficiency. Ruzita Mohd Amin and Noraini Idris' (2013) study, "Children's English Language Utilize in Multilingual Homes in Malaysia," looks at how

children in multilingual families in Malaysia use the English language. According to the study, children in multilingual households in Malaysia regularly utilize several languages, including English. The study also discovered that factors like the languages spoken at home and by their classmates had an impact on how youngsters utilize language. To add more, The Influence of Parental Attitudes on Children's English Language Use in Malaysia is a 2015 study by Siti Zalina Ahmad and Zainab Mat Saad that discovered that parental attitudes have a significant impact on children's English language use in Malaysia and that positive parental attitudes towards English language use are positively related to children's English language use in their daily lives.

The Resources

In encouraging children's English language proficiency, parents play the major role. The resources provided by parents can also be in various forms such as physically or mentally. Parental involvement in English language learning among Malaysian families is the subject of one study, "Parental Involvement in English Language Learning: A Study of Malaysian Families," by Mohd. Nadzir Osman (2013). According to the report, parents in Malaysia use a range of tools to help their kids become more fluent in English, including hiring tutors, enrolling them in language programmes, and providing English language study materials. The study also discovered a positive relationship between parental support for children's language acquisition and their ability to speak English. The involvement of parents in providing resources can actually give a positive impact towards children's English proficiency. According to a 2016 study by Norlidah Alias and Shuhaida Sari titled "A Study of Parental Support for English Language Learning in Malaysia," parents in Malaysia offer a variety of supports to help their kids become more fluent in the language, including teaching them English, encouraging them to speak it, and enrolling them in language schools. Parental support is favourably correlated with children's English language proficiency, according to the study.

Research Methodology

The design of this research focuses on the qualitative method where all of the data is extracted from an interview session with a few respondents from various backgrounds that are related to the study. To ensure the findings and results of this research is accurate and reliable, a few interview sessions were conducted with different backgrounds and household income of parents. All of the parents that were being interviewed had adhered to the characteristics of the respondent that is being set before the research being conducted. In other words, a purposive sampling is being directed in this research. The characteristics of the respondents are as follows:

- The earning of the household according to the classification of Malaysian Household Income.
- The period of being parents is at least five years and above.
- The age of their children is at least 7 years old.

Biography of the Respondents

Respondents	Gender	Household Income Class
1	Female	T20
2	Female	T20
3	Male	M40
4	Female	M40
5	Female	B40
6	Male	B40

Table 2: Biography of the respondents

All of the interview sessions are being recorded and transcribed as proof and transparency of the interview conducted. All respondents are given the same set of questions covering the three research objectives.

All of the respondents chosen are willingly to participate and there was a thorough background check that had been done before they were being selected to be interviewed. All of the respondents were given the freedom to answer the questions based on their experience or opinion.

Themes of Findings

The interview that was conducted has resulted in a few themes including the prior theme set beforehand of the study.

The themes are as follows:
- Theme 1: The parents' awareness of on the importance of English language
- Theme 2: The practice of English language in their daily life
- Theme 3: The resources provided by parents

Results & Findings

Parents' Awareness on the Importance of English Language

Based on the interview conducted, it can be seen that all of the respondents from B40, M40 and T20 agreed that English language is important for their children. The outcome of the interview is parallel to a study that has been conducted by Malaysia's Ministry of Education. As mentioned by a respondent from the B40 family household income, now the age of technology has changed… so English is very important. This is also supported by respondents from M40 and T20 family household income in which they shared, "English is very important… we mostly have to use English," and "it is important… because English is basically an international medium." According to a Malaysian Ministry of Education study,

parents are extremely important in helping their children become proficient in English and understand its significance (Ministry of Education, 2019). According to the study, parents who understand the value of English language competence for their kids' future success are more likely to support their kids' education and give them chances to practise their English.

Practice of English Language in Their Daily Life

The practice of English in the children's daily life revolves around their communication between their parents, siblings and, also, their peers. Although there are other factors that could affect each child's English proficiency, to only rely on one factor that could affect it is unreliable. Thus, there are different responses from the respondents throughout the interview session on their children's daily practice of English due to different factors. Respondents from B40 and M40 family household income mentioned, "When with friends, they usually speak English. It seems like that. Sometimes it sounds like a mixture of English and Malay too." and, "They also speak English with their friends. I rarely listen to him speak Bahasa Melayu." However, a respondent from T20 family household income said that, "the school factor that influences my children to have a good proficiency in English… my children have a command of English from school and friends." Multilingual children in Malaysia typically have greater cognitive capacities and a higher level of metalinguistic awareness, per a study by the University of Malaya (UM, 2018). This is due to the fact that kids are exposed to many linguistic structures and languages, which can improve their cognitive growth and capacity for critical thought. Additionally, children who speak multiple languages may have greater career and social mobility chances. Although there are a few respondents who admit that there are challenges that come with the weight of being multilingual. This is align with the studies from the National University of Malaysia (NU Malaysia, 2020) and University of Malaya (UM, 2018) emphasise the necessity of comprehending the complexities of multilingualism and the difficulties multilingual children in Malaysia face, as well as the significance of providing support for their language development and academic performance.

Resources Provided by Parents

Going deeper into the research objectives, all respondents were being questioned as to whether their financial situation would have the tendency to give effect towards their children's proficiency and four out of six respondents clearly mentioned that their financial situation would not be affecting their children's English proficiency. Respondents from B40 and M40 family household income mentioned that, "Mastery of English actually comes from one's own interest." "It doesn't matter what our income is, it will not affect my children's English proficiency". To add more, respondents from T20 family household income clarify that, "It actually depends on their desire, not their economic status." According to a study by the Malaysian Ministry of Education (Ministry of Education, 2019), a number of factors can affect children's enthusiasm in studying the English language. Children who view learning the English language favourably and believe it will be beneficial and important to their futures are more likely to be interested in it. Additionally, kids who are eager to learn English are more likely to have high levels of self-esteem and confidence. To add more, all of the respondents children were sent to government school and not private school which would still require the use of Malay in other subjects than English and to not use English wholly. As for the other two respondents, they believe that their household income had given a significant impact on their children's English proficiency. According to them, the income they gained is the main reason that they are able to provide more resources and opportunities for the growth of their children's English proficiency. This is supported by one of the respondent from the

M40 family household income, "It is actually affecting my children because I cannot give them the usual things that I used to give back then.

Conclusion

In conclusion, the purpose of this study to find the correlation between family household income and children's English proficiency in Malaysia is achieved as to where the relationship between family household income and children's English proficiency exist in terms of the parents' awareness on the importance of English language, the practice of English language in their daily life, and the resources provided by parents, but it is not the major factor that is affecting the children's English proficiency. Yet, there would still be a minor effect on the capability for parents to provide resources to improve their children's English proficiency. This study also reveals that the responsibility to ensure children's English proficiency does not only rely on the parents but also the community and school. All of these parties should be able to work together to ensure there is a balance of empowering English and Malay proficiency in Malaysia where most of the people are bilingual and multilingual. To wrap this study up, there is a favourable correlation between household income and children's English competence, although this is not the only aspect to consider in Malaysia. To fully understand the relationship, additional study is required, and initiatives should be taken to guarantee that kids from all backgrounds have equal opportunities to advance their English-language skills.

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University Female Leaders and Imposter Syndrome: An Exploratory Case Study in Malaysia

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Abstract
Imposter Syndrome (IS) affects individuals, specifically high-achieving females, by causing them to experience self-doubt and feelings of being fraudulent. This study employed an innovative visual quasi-gamification tool to conduct semi-structured interviews aiming to investigate how IS affects female leaders in higher education in Malaysia and how IS could be managed. It concluded that IS is displayed differently than what literature shows, as the female leaders seem to be perfectionists who do not experience immense self-doubt but rather a pressure to appear ideal before colleagues and seniors. This Study shows that female leaders manage the negativities of IS through self-awareness and reflection. It recommends re-examining how IS is perceived by investigating multiple cultures and solutions, specifically focusing on females and how their background affects their leadership in education and other fields.

Keywords: Imposter Syndrome, Higher Education, Female Leadership

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Introduction

Impostor Syndrome (IS) has gained prominence in recent years, notably since Michelle Obama highlighted this phenomenon in her 2018 memoir. Despite its contemporary recognition, the roots of this concept trace back to the 1970s, when psychologists Clance and Imes (1978) observed that accomplished women often grapple with self-doubt and a sense of fraudulence, coining the term Impostor Syndrome.

While research on IS has been ongoing since the 1970s, it has shown inconsistencies, and there is a notable dearth of studies focusing on non-medical fields, such as education and educational leadership (Bhama et al., 2021; Freeman & Peisah, 2022; Zaed et al., 2022). Furthermore, the scholarly attention given to IS in Malaysia and Asia is generally limited, with a particular oversight of females in leadership positions (Alsaleem et al., 2021; Khan et al., 2022; Shahjalal et al., 2021).

This study endeavours to fill these gaps by examining the impact of IS on female university leaders in Malaysia and investigating how IS is managed in this context. Employing an innovative approach, the research utilises an exploratory case study methodology, incorporating visuals and quasi-gamification into semi-structured interviews. The ensuing sections will provide a background to the study, followed by a comprehensive literature review, culminating in a detailed analysis, discussion, and recommendations.

The Context and Background

Female Leadership in Malaysian Higher Education
In Malaysia, the landscape of female representation among academics in higher education, particularly in public universities, stood at 56.5% in 2020. This figure slightly decreased to 54.5% in the private sector, as reported by the Higher Education Department in Malaysia (Jabatan Pendidikan Tinggi, 2020). However, it is crucial to note that this percentage diminishes significantly as one ascends the hierarchical ladder within public universities. In 2020, data indicated that only 48.4% of female academics held the position of associate professors, and a mere 34% had reached the status of professors (Ahmad, 2021).

A recent study on female leadership in higher education in Malaysia revealed that despite the majority representation of women in academia, they encounter substantial challenges in attaining leadership roles, particularly in higher administration. The persisting patriarchal notion prevails, suggesting scepticism about women's capability to lead major institutions (Badrolhisam et al., 2022). Notably, the existing studies and data primarily concentrate on governmental and public institutions, leaving a void in our understanding of female leadership in private universities in Malaysia. This gap prompted the selection of a private university for the current study.

The University Context
The chosen university, an international campus from the United Kingdom, boasts two faculties—the Faculty of Arts and Social Sciences and the Faculty of Engineering and Sciences. Despite having 47.6% female academics out of 267, only 11 women hold significant positions such as vice-provost, head, interim, program director, and deputy dean. This aligns with the broader trend observed in Malaysia, where female representation declines as leadership positions increase in importance.

Literature Review

Imposter Syndrome Behaviours and Effects

As outlined by Clance and Imes (1978, p. 1), many accomplished women grapple with pervasive self-doubt, sensing an inadequacy for the elevated positions they occupy. These women often believe that they have somehow 'fooled' their colleagues to attain success. Imposter Syndrome (IS) manifests as an overarching sensation of being undeserving or "not good enough" for the role held. Individuals grappling with IS navigate a landscape of uncertainty in decision-making and an enduring fear of exposure as incompetent or "fake" despite their diligence and proficiency (Sherman, 2013, p. 57). Instead of attributing their success to competence and self-worth, they often ascribe it to luck or fortuitous timing, minimising their agency in their accomplishments (Clance & Imes, 1978; Mullangi & Jagsi, 2019). This dynamic gives rise to two prevalent fears associated with IS.

Firstly, the fear of failure exacerbates the stress levels experienced by individuals throughout their careers and personal lives (Crawford et al., 2016; Sherman, 2013; Wang et al., 2019). Importantly, the higher an individual's level of success and leadership, the more pronounced the stress becomes for those grappling with this phenomenon (Nihalani, 2021). Secondly, the fear of success manifests as a reluctance to embrace success due to apprehensions about potential losses, such as strained relationships with colleagues and acquaintances (Neureiter & Traut-Mattausch, 2016). These fears intricately complicate the experience of IS, exerting a discernible impact on both mental health and work behaviour.

Imposter Syndrome Effect on Mental Health and Work Behaviour

Characteristics associated with Imposter Syndrome (IS) have been linked to heightened anxiety, as evidenced by research (Bernard et al., 2002). Notably, studies indicate a higher prevalence of anxiety related to IS among females compared to males (Cusack et al., 2013), and this heightened anxiety has the potential to impact work patterns significantly.

Thompson et al. propose that IS can manifest in a cyclical pattern, initially marked by procrastination and followed by a phase of over-preparation frenzy (Thompson et al., 2000). Additionally, Bowker & Schubert's (2019) study establishes a direct correlation between IS and an individual's self-esteem, emphasising its significance as a critical factor impairing normal functioning (Neureiter & Traut-Mattausch, 2016).

Individuals grappling with IS often exhibit tendencies towards workaholism, perfectionism, and difficulties in delegating tasks (Bechtoldt, 2015). Apart from striving for perfection, IS individuals feel compelled to maintain an idealised image at all times in the workplace, focusing on how they are perceived by those around them (Fields, 2020; Hoben et al., 2022). It is noteworthy, however, that despite these negative aspects, individuals with IS consistently excel in fulfilling their work and tasks effectively (Sakulku & Alexander, 2011). The paradoxical nature of overworking oneself while still achieving tasks underscores the complexity of IS.

Given the intricate interplay between work behaviour and mental health in the context of IS, comprehending the effects of IS on females in academic leadership becomes particularly crucial.

IS characteristics could lead to anxiety (Bernard et al., 2002); a study found that more females suffer from anxiety emerging from IS than men (Cusack et al., 2013), which could affect work patterns.

Thompson et al. believe IS could lead to an initial phase of procrastination followed by a phase of over-preparation frenzy (Thompson et al., 2000). Furthermore, Bowker & Schubert (2019) conducted a study that revealed this phenomenon directly correlates with one's self-esteem (Neureiter & Traut-Mattausch, 2016). This is claimed to be one of the most important factors that impair one's ability to function normally when suffering from IS.

IS individuals experience workaholism, perfectionism tendencies, and struggles in task delegation (Bechtoldt, 2015). Besides perfectionism, IS individuals need to appear ideal all the time at work and focus on how they are perceived by those surrounding them (Fields, 2020; Hoben et al., 2022). However, despite all these negative notions, it must be explained that IS individuals fulfil their work and tasks very well (Sakulku & Alexander, 2011), even though they overwork themselves. Since work behaviour and mental health are involved in IS, an understanding of the effects of IS on females in academic leadership is important.

Imposter Syndrome in Academic Female Leadership

Academics experience IS since they believe the institution did them a favour by hiring them. They become reluctant to attend leadership meetings as they do not feel worthy of their position or future promotions (Ladonna et al., 2018). In addition, female academics could miss out on leadership opportunities due to the IS notions, as they might refuse leadership positions in higher education institutions since they feel undeserving of these offers (Arleo et al., 2021).

Delving deeper into women's experiences in academia, lecturers offer their insights through a published article that takes an anecdotal approach yet provides a unique perspective on Imposter Syndrome (IS). In an engaging narrative, Hoben et al. (2022) articulate how university lecturers often navigate a realm where they feel like they are merely playing the role of "princesses of academia," grappling with a persistent struggle to establish a sense of belonging in their academic pursuits.

Moreover, a study conducted by Arloe et al. (2021) sheds light on how IS acts as a formidable obstacle hindering women from assuming leadership roles and progressing in such positions. This corroborates the notion that female leaders are particularly susceptible to the impacts of IS (Sherman, 2013). Notwithstanding these challenges, the literature suggests the existence of management interventions aimed at addressing IS in academic settings.

Interventions and Solutions of Imposter Syndrome

Scholars have proposed various solutions and interventions to address Imposter Syndrome (IS). One organisational approach involves creating opportunities for women in leadership roles, recognising and commending their contributions, and routinely evaluating the organisational system to ensure inclusivity and fairness (Mullangi & Jagsi, 2019). Additionally, mentorship programs, strategic onboarding processes, and fostering a safe environment for individuals to share their challenges within a trusted professional network have been suggested as effective strategies (Lacey et al., 2017).

Conversely, Sherman (2013) advocates for a more personal approach, emphasising the importance of individuals engaging with mentors, actively acknowledging and monitoring their self-talk, avoiding the trap of perfectionism, and gaining a clear understanding of their strengths while working to overcome personal fears. This individualised perspective aligns with the notion that addressing IS involves a combination of self-awareness and proactive self-management. Similarly, seeking support from a therapist or confiding in a trusted person is highlighted as a viable personal strategy to cope with IS (Martinez & Forrey, 2019). The duality of organisational and personal interventions underscores the multifaceted nature of combating Imposter Syndrome.

Methodology

This section describes how the innovative visual and quasi-gamification instrument was drafted, how participants were chosen, and how the study met ethical requirements. This research is a case study employing qualitative methodology. Yin Field (2018) states that case studies explore answers involving how something happens, hence understanding the details of issues and their manifestations.

The Instrument

Interview questions in this study were based on the research questions relevant to recent literature on IS, drafted gradually, starting with simple and general questions to more specific ones (Britten, 2006). This followed a semi-structured interview methodology, where questions are designed and used to comprehend responses from participants regarding a phenomenon or situation they have experienced or have been subjected to via a relatively detailed interview (McIntosh & Morse, 2015).

The number of questions recommended for interviews is between five and ten (Creswell & Creswell, 2018). Therefore, an innovative methodology was employed; the same material used for the interview was transformed into a visual tool in a PowerPoint presentation (PPT). It was extracted from web pages about the topic, published by a website that raises awareness of mental illness and biological disease (Charleson & Gans, 2021; Cuncic & Morin, 2021). Images and infographics were designed to attract the participants' attention. Great value is gained by using visual tools to facilitate and simplify the process of interviewing participants in qualitative research since it enhances the understanding of the participants (Glegg, 2019). The interview was also interactive and similar to gamification methods, which fostered a higher level of motivation (Sailer et al., 2014). Participants viewed the displayed infographics, took a minute to process the information, and were asked to speak about how relevant it is to their lives and experiences.

Piloting the Instrument

Piloting the PPT interview resulted in positive feedback and a clear understanding of the topic and questions; only a few edits were made, such as adding animation to some slides and rewording some points. The methodology was interesting, kept participants engaged, and displayed information clearly. This aligns with the notion that piloting qualitative research aids in refining the instruments, whether questionnaires or interviews, revealing gaps and vague matters. This also contributes to maintaining ethics and research verification methods (Sampson, 2016).

The validity of qualitative research was taken under consideration is the investigator's responsiveness, including the categorisation of themes of the interview, what is omitted and what is kept, and the general decision-making process affecting the outcome of the analysis and results (Morse et al., 2016), in addition to sending the interview questions to a scholar colleague to achieve face validity (Noble & Smith, 2015). As for measuring the reliability of the results, the repeatability and frequency of common answers from participants ensure consistency, duplication, and unification of outcomes (Long & Johnson, 2000). Also, trustworthiness is of utmost importance in this research, particularly since it depends on collecting raw qualitative, in-depth data from participants relating to details, deep thoughts, and ideas. Therefore, the points noted down by Elo et al. (2014) was taken into account. This entails a non-biased, neutral and hospitable environment that allows the participant to respond freely during the interview without leading the dialogue towards certain answers, whether online or in person.

Interview Modes

There were two ways to introduce the semi-structured interview: one was virtual via the Zoom online platform, and the other was face-to-face. All potential participants were given the choice to provide them maximum comfort. The interviews were mostly conducted via Zoom; however, two interviewees opted for a face-to-face setting. It was a great chance for the author to notice the participants' body language, facial expressions, and reactions to understand what they experienced on a deeper level.

Transcription

The interviews were recorded, and the audio files were extracted and transcribed verbatim; transcription was done through a high-quality speech-to-text programme and then reviewed manually for errors. The verbatim transcription method was chosen to record all the interview details and interpret the participants' body language or facial expressions to increase reliability, validity, and trustworthiness (Easton et al., 2000; Seale & Silverman, 1997). After transcribing the data, a thematic analysis was conducted using the inductive methodology proposed by Braun and Clarke (2012). This approach allowed for the emergence of themes directly from the data, providing a comprehensive exploration of the content. The analysis delved into addressing the research questions in-depth and establishing connections with the relevant literature introduced at the study's outset, as outlined by Braun and Clarke in 2006.

The Participants' Sample Size

This study reached out to female leaders in a private university in Malaysia, and only females from the non-medical and non-STEM faculties were approached to bridge the gap in research by focusing on arts and social sciences. Participants were approached through purposive sampling via university email.

The choice of participants depended on the role they played in their department as leaders, where education leaders are the individuals who have the authority or autonomy of decision-making to influence learners' lives, outcomes, and learning environment (UNESCO, n.d.). Practically, this was applied by corresponding with female educators who lead teams or units, can shape the university, and influence students, such as programme directors, heads of schools, and directors of teaching and learning.

The headcount of the number of female leaders fitting the criteria was 28. Hence, all of them were approached. According to the literature, the average participant response rate in interviews is 36.6% (Yang et al., 2006). The response rate of this study is 42.2%, as it generated 12 participants. Finding the perfect sampling size for qualitative research is a challenging task. It could be based solely on the researcher's experience and instinct provided by the surrounding conditions of the study (DiCicco-Bloom & Crabtree, 2006). Yin (2003, 2018) does not recommend a specific number of participants in case studies specifically, and that in-depth semi-structured interviews that are designed to elicit the details of a social and emotional phenomenon would not profoundly rely upon specific sample size numbers but rather on the level of depth and saturation of data, the interviewees provide. This was conducted with ethical considerations in mind.

Ethical Considerations

The topic of IS does not hold any sensitivities in general, as it is a phenomenon that could affect any member of society and not only females (Abdelaal, 2020), even though this study focuses on females in particular. The name "imposter" could give the wrong impression to participants. Hence, explanations and infographics about the syndrome were presented. To address any sensitivities or socially awkward issues, the questions were drafted within a professional scope, graded from general to more specific, and subtly phrased not to trigger any participants, even though this point is minor in the study.

The confidentiality and anonymity of the participants were clearly stated in the information sheet and consent form. Coercion was not a concern in this study, as the interviewer did not know the participants in advance, except that they were education leaders in the university. There was also no conflict of interest, as the interviewer does not work at the university. The results provided by this study did not benefit the authors in any way other than fulfilling the investigation query. Bias was an irrelevant point, as the author is not Malaysian and is interviewing the participants as an international student; the only shared factor between the participants and the researcher is that both parties are female. Finally, this study fully complied with British Educational Research Association (BERA) guidelines (*Ethical Guidelines for Educational Research, Fourth Edition*, 2018), which ensured participants' protection while reaching valid results as displayed in the next section.

Analysis and Discussion

The results reveal how female leaders in higher education in Malaysia experience IS, what characteristics are displayed in this context, and the different solutions they use when faced with this issue.

Prominent IS Characteristics

Feeling Fraudulent and Experiencing Self-Doubt
Contrary to prevailing literature expectations, female leaders in this study did not exhibit a strong inclination towards Impostor Syndrome (IS), which encompasses doubts about one's deservingness of a leadership position and feelings of inadequacy (Clance & Imes, 1978; Sherman, 2013). The anticipated self-doubt commonly associated with IS was not a prevalent theme among the participants. In contrast to scholarly beliefs, these leaders did not express feelings of being fraudulent, fake, or incompetent. Some participants acknowledged experiencing self-doubt early in their careers, but such concerns diminished with time and

experience, a departure from the commonly held belief that seniority exacerbates IS-related stress (Nihalani, 2021).

Participant E exemplified this trend by recalling initial doubts about deserving the leadership position but noting that these doubts dissipated with two years of experience on the job. This unexpected finding challenges the conventional understanding of IS, suggesting a potential influence of the international campus setting and institutional policies on leadership perceptions.

Instead of grappling with personal doubts, female leaders in the study were notably preoccupied with how their colleagues perceived them. The need to maintain an ideal professional image was a recurrent theme, often interlinked with concerns about confidence in decision-making (Fields, 2020; Hoben et al., 2022). Participant G exemplified this by expressing anxiety about the consequences of not addressing a problem effectively, fearing it would tarnish her reputation. She emphasised the significance of colleagues' perceptions, stating, "I am very, very concerned... about how my colleagues perceive me and whether they think I'm good to work with and whether they're happy with the way the school is run."

This focus on external perceptions aligns with the experiences of well-established academics who face constant pressure to appear flawless and competent (Hoben et al., 2022). The study further revealed instances where female leaders admitted to struggling with confidence in decision-making, expressing uncertainty about their abilities compared to potential alternatives (Arleo et al., 2021; Sherman, 2013). Participant B exemplified this by suggesting that others might be more skilled in leadership roles, leading to apprehensions about their own efficacy.

In summary, the unexpected findings from this study challenge established notions about IS in female leaders. While the anticipated self-doubt associated with IS did not prominently feature in their experiences, concerns about colleagues' perceptions and the pressure to appear ideal emerged as significant factors. The emphasis on external validation and occasional doubts in decision-making point towards a nuanced manifestation of challenges faced by female leaders, distinct from traditional IS narratives.

Understanding the Fear of Failure and Success

Impostor Syndrome (IS), characterised by fears of success, fear of failure, and attributing success to luck, typically induces workplace stress (Crawford et al., 2016; Sherman, 2013; Wang et al., 2019). Surprisingly, female leaders in this study did not exhibit a pronounced fear of success; instead, the fear of failure emerged as a significant concern. Participants A, B, F, and K articulated apprehensions related to how failure might be perceived by others, highlighting stressors impacting both personal and career aspects (Crawford et al., 2016; Sherman, 2013). Notably, their fear of failure centred around external perceptions, emphasizing how colleagues view them rather than their own self-perception—a unique manifestation of IS in this context.

Furthermore, the study identified a weak tendency among participants to attribute success to luck or timing, contrary to established IS characteristics (Clance & Imes, 1978; Mullangi & Jagsi, 2019). Instead, success was often attributed to factors such as hard work, parental upbringing, and persistence, reflecting a divergence from conventional narratives.

Procrastination

Procrastination emerged as a coping mechanism employed by female leaders to manage burnout associated with overwhelming workloads. Contrary to the literature suggesting that procrastination is linked to anxiety and negative emotions (Thompson et al., 2000), participants attributed their procrastination to the sheer volume and complexity of tasks. For instance, Participant A acknowledged procrastinating when fatigued, while Participants E and J admitted procrastinating when faced with challenging tasks, opting to complete easier ones first as a strategy to alleviate stress.

Methods of Managing Imposter Syndrome

Self-Awareness and Personal Management of Imposter Syndrome

In terms of managing IS, several female leaders employed self-awareness and personal strategies. Participant D emphasized the importance of self-awareness, encouraging women to identify strengths, weaknesses, and set goals to counter IS negative emotions. This aligns with Sherman's (2013) recommendation of understanding one's strengths and weaknesses as a key strategy. Similarly, Participant J advocated for self-awareness in acknowledging problems, identifying their causes, and seeking solutions. Participant K suggested seeking professional help and engaging in hobbies as creative outlets, aligning with Martinez and Forey et al.'s (2019) emphasis on therapy and personal pursuits as remedies for IS.

Moreover, participants highlighted the significance of open communication with close associates—family, friends, and colleagues—as a means of seeking support for managing negative emotions associated with IS. Importantly, they stressed the need for females to openly discuss IS and related issues, emphasizing an individual responsibility rather than attributing it to organizational initiatives. Participant B articulated the transformative power of speaking up and sharing experiences, viewing it as a personal effort among females to foster change, contrary to the literature proposing organizational reforms (Mullangi & Jagsi, 2019).

Support Groups and Work Environment Enhancement

Regarding organisational interventions, mentoring, a safe work environment, and support groups were mentioned by participants as potential solutions. However, there was a lack of clarity on how these initiatives could be implemented. Participants acknowledged the need for trustful networks, indicating a preference for confiding in selected female colleagues and leaders, potentially forming the basis for the trust networks suggested in the literature (Lacey et al., 2017). Despite acknowledging some room for organisational improvements, participants expressed skepticism about the impact of gender equality programs and training initiatives, suggesting that these interventions may not address deep-rooted issues like IS effectively.

In conclusion, the study challenges traditional notions of IS among female leaders, revealing unique manifestations and coping mechanisms. The focus on external perceptions, the preference for personal strategies, and the emphasis on individual responsibility in managing IS shed light on a nuanced experience that diverges from mainstream literature. The study also highlights the importance of open communication and trustful networks among female leaders, providing insights for both individual and organisational interventions to address IS in the workplace.

Conclusion

This study investigated how IS affects female higher education leaders in Malaysia. It explores IS manifestations and management solutions in a private higher education institution in Malaysia. The study employed an innovative visual quasi-gamification method to facilitate and simplify the interviewing process with participants, which provided an appropriate environment to discuss the phenomenon in depth. Moreover, procrastination is regarded as an issue, and a lower level of self-confidence in decision-making exists, which impedes leadership.

This research concludes that IS manifests uniquely in the context of females leading higher education in Malaysia. Participants do not suffer from significant self-doubt notions or perceive themselves as fraudulent. However, they experience an immense need to appear ideal in the eyes of their colleagues and those who surround them, in addition to a need to perfect many work aspects.

As for the management of IS, female leaders believe that individual self-awareness and reflection are the solutions to the problem. According to the participants, awareness needs to be raised, and leaders need to educate their subordinates and colleagues about female leadership issues such as IS.

Recommendations

The outcomes of this study do not agree with many of the points in the literature, proving a need for further investigation of the phenomenon in different cultures and regions. What emerges from Europe, the US and the West does not necessarily apply and fit the context in other parts of the world due to cultural variations and norms. Hence, more studies focusing on Malaysian and Asian contexts are needed.

Moreover, this study recommends that higher education institutions in Malaysia and Asian countries raise awareness about IS as a female leadership issue. There is a need for IS empirical research in this context that could build the fundamental theoretical basis of awareness campaigns and programmes. These campaigns could be integrated into higher education as part of onboarding strategies. Mentoring, support groups, and professional therapy services for higher education leaders, especially females, are heavily required. These campaigns could also include undergraduate and postgraduate students as preventive measures to minimise the occurrence of IS at an early stage of female leaders' careers.

Furthermore, innovative visual aids and quasi-gamification methods have been very beneficial during the interviews. Thus, finding research methods outside the box is recommended to ease the interview process, specifically when tackling complex topics involving highly personal issues.

Limitations

The lack of literature about IS in Malaysia and Asia mentioned previously is considered a limitation, as it does not allow contextual comparison. Moreover, since it is a small-scope case study, the number of participants does not represent all Malaysia or all female leaders in Malaysia. However, it provides a preliminary indication of how IS affects female education leaders. Another limitation is the university, as it is a private international campus and not a

public one representing many of the universities in Malaysia. Nevertheless, the female leaders are Malaysians or females working and living in Malaysia under Malaysian law; hence, they are affected daily by the dynamics and work culture of the country.

Finally, the findings of this study are limited since an interpretation from a psychological perspective could further clarify many issues. Hence, a professional psychological understanding could have strengthened the results. In addition, the study focuses on female participants only and does not include any comparison to male leaders and how they experience IS.

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Literature Review of the Relationship Between Physical Fitness, Physical Activity, Cognitive Functioning and Academic Success

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Abstract

The objective of this paper is to provide an extensive literature review of academic papers written in English about The Relationship Between Physical Fitness, Physical Activity, Cognitive Functioning and Academic Success. The research is showing that there are more and more benefits of physical fitness and physical activity on students cognitive (executive functions) and academic success, and it has been implemented into many different educational systems already. Usually, we can find many literatures review where authors compare how either physical fitness or physical activity benefits cognitive or academic success, but approach in each culture or education system is quite different. The studies reviewed suggest that physical activity and physical fitness are positively affecting academic performance and cognitive development, but it has been rarely compared how all 4 items are affecting each other and more research should be done from that perspective. Physical fitness and physical activity are definitely proven to be beneficial for students thinking and solving academic exams, but there is further investigation to be done to see how more beneficial physical activity and physical fitness can be regarding cognitive functioning (executive functions) and academic success.

Keywords: Cognitive Development, Executive Functions Physical Fitness, Physical Activity Benefits

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Introduction

The benefits of every day including in physical action in childhood have been broadly examined, appearing reverse connections between physical movement and cardiovascular chance, and with advantageous impacts on a few mental wellbeing results (Bull et al., 2020, p. 1451-1462; Penedo & Dahn, 2005, p. 189-193). Moreover, physical movement has demonstrated to be an vital figure in corpulence and malady avoidance in children (Janssen & LeBlanc, 2010; Strong et al., p. 732-737). There's too prove proposing that physical action is related with a few angles of brain work and cognition (Ellemberg & St-Louis-Deschênes, 2010, p. 122-136; Fedewa & Ahn, 2011, p. 521-535; Hillman et al., p. 58-65). In this way, both intense and unremitting direct to incredible physical movement intercessions might deliver changes in brain structure and work in children matured 6 12 a long time, as well as cognition, and scholarly results (Erickson et al., 2019, Greef et al., p. 501-507). These changes may progress cognitive capacities such as concentration, consideration, official work, and working memory (Donnelly et al., 2016, p. 1197-1222; Hillman et al., 2008, p. 58-65) tha are significant for academic success (Fedewa & Ahn, 2011, p. 521-535). For occurrence a few controlled ponders have affirmed that physical action can improve scholarly substance learning such as language (Barnett et al., 2008, p. 299-313) or mathematics (e.g., Cecchini & Carriedo, 2020, p. 121-125). Subsequently, changes in these cognitive capacities as a result of expanded PA might, in turn, make strides children s scholastic accomplishment (Gonzalez-Sicilia et al., 2019, p. 135-141; Mullender-Wijnsma et al., 2016; Zeng et al., 2017). In this regard, the association between physical activity and physical and cognitive health outcomes is more consistent and consistent across higher and lower intensity physical activities. (Poitras et al., 2016, p. 197-239). This ponder pointed to look at the affect of students s physical movement on making strides their official capacities and accomplishing way better scholastic comes about. Preparatory center of this investigate will be to look at and degree in which arrange, integration of English, science and science into physical instruction lessons moves forward understudies cognitive and scholastic execution. It is proposed that the physical instruction profession essential concern ought to be for advancement of health related physical wellness, characterized as a state characterized by a an capacity to perform day by day exercises with vigor, and show of characteristics and capacities that are related with moo chance of untimely improvement of the hypokinetic infections. In expansion, physical wellness and engine execution are terms which will have utility for proficient physical teachers, in case agreement can be built around exact exacting and operational definitions(Pate, 2012，p.174-179; Rauschenbusch, 2013,p. 49-51). Both physical action and physical wellness produce normal inspiration, make enduring conditions of challenge, and minimize the affect of components repressing official capacities stretch, boredom, need of rest, and oxygen (Diamond and Ling, 2016). Number of thinks about reported positive joins between physical action and cognitive execution in preschool age children (Sibley and Etnier, 2003; de Greeff et al., 2018, p. 501-508). Advance, past inquire about pointed on critical connection between physical movement and physical wellness (Latorre-Román et al., 2016, p. 450-455). Hence, the degree of physical wellness in preschoolers may well be candidate altogether related to the degree of cognitive or official capacities (Visier-Alfonso et al., 2020). Indeed in spite of the fact that, later considers bolster this suspicion the part of physical wellness and its certain components a solid and b engine component in improvement of official capacities abilities is still open issue.

However, in all those considers, there's need of discoveries with respect to how really integration of other subjects into physical instruction course influences students cognitive capacities and how overhauling coordinates physical instruction Educational programs seem

influence understudies cognitive and scholastic execution. The relationship between physical activtiy, physical fitness and benefits on cognitive functioning and academic success is proved more than several times in this literature review and below there is detailed description where authors are combining one or two items and showing it's benefits to cognitive functioning and development.

Terminology

Physical activity, excercise, and physical wellness are terms that portray distinctive concepts. In any case, they are frequently befuddled with one another, and the terms are in some cases utilized traded. This paper proposes definitions to recognize them. Physical movement is characterized as any real development delivered by skeletal muscles that comes about in vitality use. The vitality consumption can be measured in kilocalories. Physical movement in way of life can be categorized into occupational, sports, conditioning, family, or other exercises. Exercise may be a subset of physical action that's arranged, organized, and tedious and has as a last or a middle of the road objective the change or upkeep of physical wellness. Physical wellness may be a set of qualities that are either wellbeing or skill related. The degree to which individuals have these qualities can be measured with particular tests. These definitions are advertised as an interpretational system for comparing ponders that relate physical action, work out, and physical wellness to wellbeing (Dishman et al., 1985). According to Green (1996) Cognitivism comes from cognitive physiology to other measurements like social physiology, identity, psychotherapy, improvement, and indeed assist. Word cognitive is regularly utilized as a synonymous with mental or mental. In this case, cognitive working co related with physical wellness and physical action appears us how critical physical action and physical wellness really is and how it creates official capacities which are portion of cognitive working and at the same time moving forward understudies' scholarly victory.

Relationship Between Physical Fitness, Physical Activity, Cognitive Functioning and Academic Success

Many authors are emphasizing the truth that physical wellness and physical action ought to not as it were center on wellness and don improvement but or maybe to consider human needs and values (Ryan & Ryan, 2020, p. 16–26). Our primary objective will be to characterize positive perspectives on understudies cognitive and scholarly execution utilizing one wear school considering to current angles of physical instruction. This inquire about will allow us answers how physical action and physical wellness can effectively create official capacities and help understudies accomplish way better scholastic comes about. Inquire about points to show that physical movement and physical wellness in wear school is exceptionally critical in open schools and on the off chance that it is utilized through certain period of a long time, it'll appear impacts on creating students official capacities in a way that recreations on English dialect they are playing amid physical instruction coordinates classes are unwittingly moving forward their official capacities. That being said, it is anticipated that due to continually utilizing English dialect amid coordinates physical instruction classes and taking after English dialect manual through physical instruction recreations, understudies will memorize it speedier and have superior understanding of English lexicon and language structure and accomplish way better scholarly English dialect comes about comparing to understudies in other open schools which are not utilizing English dialect amid physical instruction classes.

Benefits of Physical Fitness and Physical Activity

Executive function appears to be more sensitive to aerobic exercise than other aspects of cognition. (Colcombe & Kramer, 2003, p. 125-130). Executive function is the control of cognitive functions to achieve a goal and is mediated by circuits in the prefrontal cortex. Planning and executing the sequence of actions that constitute goal-directed behavior requires the allocation of attention and memory, the selection and inhibition of responses, goal setting, self-monitoring, self control, and the skillful and flexible use of strategies. (Eslinger, 1996, p. 367-395; Lezak, Howieson, & Loring, 2004). The executive function hypothesis was proposed based on evidence that aerobic exercise selectively improves older adults' performance on executive function tasks and leads to a corresponding increase in prefrontal cortical activity. (Colcombe et al., 2004, p. 3316-3321; Kramer et al., 1999, p. 418-419). Children s cognitive and neural advancement may be touchy to physical movement (Diamond, 2000, p. 44-56; Hillman, Erickson, & Kramer, 2008, p. 58-65; Kolb & Whishaw, 1998, p. 43-64). Hypothetical accounts of the joins between engine behavior and cognitive improvement amid childhood have extended from hypothesized brain systems to the development of perception action representations (Rakison & Woodward, 2008, p. 1209-1213; Sommerville & Decety, 2006, p. 179-200). According to Tomporowski, Bryan and McCullick 2015 children are profoundly persuaded by problem solving recreations, and the cognitive abilities they create whereas locked in in these diversions can be interpreted into their scholastic victory. Current issue understudies are confronting in English, science and science is classroom environment and not being able to imagine genuine utilization of those subjects.

Summary of the Literature and Key Findings by Relevant Authors

A review of previous studies relevant to this study may provide a basis for understanding how physical fitness and physical activity affect cognitive function and academic performance. We can compare the amount of daily exercise in different cultures and countries and how active they are when we talk about physical fitness and physical activity. This article focuses on the relationship between physical fitness and physical activity and how they affect cognitive and executive functions and how this impacts students' academic success.

Author	Research Focus	Key Findings
Marttinen et al., (2017)	Physical activity and academic performance	Positive effects on academic performance
Rauschenbach, (2013)	Physical education and general activity of students	Physical activity helped students in their daily duties
Bull et al., (2020)	Physical activity and mental health outcomes	Physical activity helps improve mental health
Penedo & Dahn, (2005)	Physical activity and mental health outcomes	Physical activity helps improve mental health and executive functions
Ellemberg & St-Louis-Deschênes, (2010)	Executive functions and physical activity	Physical activity positively affecting development of executive functions (cognitive functioning)
Fedewa & Ahn, (2011)	Executive functions and physical activity	Physical activity improved daily usage of executive functions
Erickson et al., (2019)	Executive functions and Physical fitness	This study shows the positive aspects of physical training in relation to cognitive performance and improved executive function.

Donnelly et al., (2016)	Physical activity, fitness, cognitive function, and academic achievement in children	One of the rare types of research that connects all four points. Research has shown that physical fitness and physical activity have a major impact on academic performance.
Hillman et al., (2008)	Exercise effects on brain and cognition.	This study shows effects on the brain and cognition. The results showed that getting enough exercise had a more positive effect on brain activity and cognitive function than those who did less or no exercise.
Barnett et al., (2008)	Educational effects of the tools of the mind curriculum: A randomized trial.	The results suggest that a developmentally appropriate curriculum with a strong emphasis on play can promote learning and development and improve both social and academic performance of young children.
Cecchini & Carriedo, (2020)	Effects of an interdisciplinary approach integrating mathematics and physical education on mathematical learning and physical activity levels.	Integrating physical activity into learning environments such as math has been shown to help develop tools that improve math learning (e.g., subtraction. Likewise, this interdisciplinary approach has proven useful in increasing children's physical activity throughout the day.
Gonzalez-Sicilia et al., (2019)	Prospective associations between participation in leisure-time physical activity at age 6 and academic performance at age 12.	The study shows that higher levels of leisure time physical activity at age 6 were associated with better teacher ratings in language and mathematics 0.075 and 0.102, respectively and self-ratings in language 0.103). and also with higher academic engagement 0.077) at age 12. Regression coefficients are standardized. All associations were significant p 0.05). Promoting leisure time physical activities can be an effective way to encourage children to exercise and help them improve their academic performance, leading to broader long-term benefits.
Mullender-Wijnsma et al., (2016)	Physically Active Math and Language Lessons Improve Academic Achievement: A Cluster Randomized Controlled Trial	Study result: Physically active school lessons significantly improved the performance of elementary school students in mathematics and spelling and is therefore a promising new way of learning.
Zeng et al., (2017)	Effects of Physical Activity on Motor Skills and Cognitive Development in Early Childhood: A	The results support causal evidence for the effects of physical activity on both motor skills and cognitive development in preschool children. Given the lack of

	Systematic Review	available research, future studies with larger, representative samples are needed to examine the associations between physical activity and cognitive domains and to strengthen and confirm the evidence for dose response responses in early childhood.
Visier-Alfonso et al., (2020)	Executive functions mediate the relationship between cardiorespiratory fitness and academic achievement in Spanish school children aged 8 to 11 years	Children who scored higher in both CRF and executive function performed better in math and language. The results showed that a significant portion of the positive effects of CRF on academic performance were mediated through improvements in inhibition and cognitive flexibility. Thus, this study supports the hypothesis that improving CRF may contribute to improved academic performance not only through a direct mechanism but also through improved executive function.

Conclusions

We took the following 15 research as our core to investigate effects on main research. In 5 out of 15 research we see positive aspects of physical activity and academic development (Marttinen et al., 2017, p. 37–49., Rauschenbach, 2013, p. 49-51., Bull et al., 2020, p. 1451-1462; Penedo & Dahn, 2005, p. 189-193). Most research are proving positive aspects physical activtiy and fitness has on executive functions and cognitive development (Ellemberg & St-Louis-Deschênes, 2010, p. 122-136; Fedewa & Ahn, 2011, p. 521-535; Hillman et al., p. 58-65., Erickson et al., 2019, Greef et al., p. 501-507., Donnelly et al., 2016, p. 1197-1222; Hillman et al., 2008, p. 58-65., Fedewa & Ahn, 2011, p. 521-535., Barnett et al., 2008, p. 299-313., Cecchini & Carriedo, 2020, p. 121-125., Gonzalez-Sicilia et al., 2019, p. 135-141; Mullender-Wijnsma et al., 2016; Zeng et al., 2017., Maurer and Roebers, 2019, p. 607-620; Visier-Alfonso et al., 2020).

As we can see from literature review there are not too many research about relationship between physical activity,physical fitness, cognitive functioning and academic success. Those we have shows significant connection between Physical activity, Physical Fitness and it's positive aspects on Cognitive functioning (executive functions) and automatically on Academic success.

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Exploring the Impact of Digital Escape Rooms on Postgraduate Students' Academic Achievement and Intercultural Awareness in Management Education: A Case Study in the UK

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Abstract

In the past few decades, educators have been questioning the effectiveness of traditional passive face-to-face learning and increasingly adopted innovative learner-focused digital game-based strategies which enhance student autonomy. This article presents an educational intervention that addresses the gap in the literature regarding the impact of Digital Escape Rooms (DERs) in Management Learning and Education offering insights of the adoption of this technique in the UK. This revolutionary method was used with 80 postgraduate students in terms of a Global HRM Course. Students were taught various Intercultural Management theories in terms of a module. The ultimate goal of this project was to increase students' engagement, academic achievement, and intercultural awareness responding to the increased demand for hybrid learning strategies catering for all learners' needs. DERs were used as a revision tool to enhance students' command of cross-cultural theories while working in teams. Learners offered anonymous feedback via Mentimeter after participating in a DER activity before their final assignment submission and wrote a report about their experience. Participants confessed that the use of DER had a positive impact on student teamwork and learning attitudes, academic achievement, development of intercultural awareness, attendance, retention, and progression. They revealed that the DER activity increased their autonomy, decision-making skills and team-bonding. It also helped even low-performing students better understand and retain the theories learnt. This project aspired to support educators, students, and academic managers by offering useful recommendations for the effective use of DER tasks into their existing teaching practices and activities.

Keywords: Digital Escape Rooms, Intercultural Awareness, Management Education, Academic Achievement, Human Resource Management, Learning Attitudes, Experiential Learning

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1.   Introduction

Surrounded by technology from a young age, learners lately acquire new knowledge, process relevant information, and react in a different way to the old-fashioned face-to-face passive way of learning. Lengthy tutor-focused lectures in terms of which learners listen and keep notes belong to the past, and lecturers are recently challenged when they try to involve and interact with multilingual and multicultural cohorts of international students as is nowadays the norm in the increasingly internationalized Higher Education (HE) in the UK and globally. Traditional teaching, learning and assessment strategies belong to the past and there is a pressing need for new techniques which incorporate experiential and technology-infused learning and have a substantial impact on students' overall learning experience (Serdyukov, 2017). Therefore, lecturers around the world experiment with new approaches, especially in the post-Covid-19 era during which remote digital learning became the new norm for all educational institutions globally for almost 3 years. These innovative technology-enhanced techniques, which combine elements of digital and playful learning, seem to keep students' interest and involvement in learning alive, especially when theories are taught and applied within a playful game-oriented context. Several studies conducted in many universities around the world showed that the use of video games in HE enhanced learners' academic performance and approach towards learning as they may result in significant enhancement in students' understanding and application of theories, increased engagement, and more favorable attitudes towards learning (Fotaris et al., 2016). Furthermore, Barata et al. (2013) indicate that learners who attend a game-based course i.e., by using a Lego as a Serious Play game, attend classes with more enthusiasm, report that they find their classes more enjoyable, and believe that learning is more engaging and interactive.

Game-based learning (GBL) uses playful methods and techniques to make learning enjoyable, interactive, assist learners better understand and retain the theories learnt, and use them more constructively solving everyday challenges. This engaging highly interactive virtual learning context effectively promotes situated experiential learning. Unlike the repetitive lectures which foster passive learning, GBL can support participants' varying learning styles, preferences and needs promoting inclusion and Social Justice in learning thus preventing confusion, lack of engagement, and repetition enhancing participants' learning experience (Csikszentmihalyi, 1990). Several educators and researchers, who have examined how GBL could be implemented in HE classes, claimed that video games which participants could play either individually or as parts of a team could improve their comprehension of new theories (Giang et al., 2018) and enhance intercultural awareness and communication, exchange of ideas and problem-solving (Dietrich, 2018).

Digital escape rooms (DERs) were first employed by educational practitioners who could successfully use and were impressed by either recreational escape rooms or escape room video games (Veldkamp et al., 2020). Healy (2019) states that DERs, unlike other playful approaches, engage students by involving them in problem-solving tasks, which frequently require them to work in teams and complete the tasks within a strict time limit, using various quizzes, puzzles, problems and challenges based on suspense, educational challenge, cooperation, enthusiasm, and rewards (p. 24). Fotaris and Mastoras (2019) discuss the differences between ordinary games and DERs stressing that they have specific characteristics relevant to: game type (digital, face-to-face or mixed); location (home, class or lab); time limit (average of 30–60 min); and team size (3–10 members). Botturi and Babazadeh (2020) also talk about a star model which stresses that DERs have five characteristics: (a) the narrative - the story, (b) the game flow - the structure of the game, (c)

puzzles, (d) equipment items (digital), and e) learning process. Veldkamp and van de Grint (2020) indicate that tutors should align DERs with the classroom, and systematically assess learners' performance. To enhance the educational process, Eukel and Morrell (2020) suggest a cycle design process to improve learning and favourable students' attitudes comprising designing, experimenting, assessment, redesign, re-assess, and repetition. Fotaris and Mastoras (2019), who reviewed several projects examining the use of DERs, and Veldkamp and associates (2020) mention benefits in learning attitudes, cooperation, student interaction, learning, the creation of online learning contexts and interpersonal communication skills development.

DER activities are closely linked to many learning theories as scientists mention that they share characteristics of both social constructivism and behaviorism (Quariachi & Wim, 2018; Zhang et al., 2018) since gamers construct their knowledge based on realtime experiences within specific tasks in DERs (Franco & DeLuca, 2019; Quariachi & Wim, 2018) and behaviorism as positive behavior, cooperation and idea and knowledge exchange are further developed and retained through the use of DERs (Zhang et al., 2018). Moreover, as DERs are "live-action team-based games", they also have many characteristics which are closely linked to a socio-cultural approach to learning (Quariachi & Wim, 2018; Zhang et al., 2018), that is the influence of social settings that frame the players' social interactions which emerge among the gamers. In conclusion, DERs are employed for educational purposes and are seen as a solution to the challenges that tutors in HE face when they attempt to engage students in deep and meaningful communication and cooperation, other-awareness, critical thinking, decision-making and tolerance and active purposeful learning.

This article explored the use of a DER as a promising revision strategy that can be used to support learners while revising concepts they had learnt and enhance their understanding of existing theories and concepts by applying them while participating in entertaining but also well-designed games which support team-building, peer support, mental well-being and the enhancement of major professional skills, i.e., cooperation, problem-solving and critical thinking. The most prominent goal was to foster EDI and Social Justice in HE as DERs provide the necessary support for low-achieving learners, i.e., BAME, international and neurodiverse learners and develop their learning abilities while connecting at a deeper level with their fellow students. Instead of condemning students to isolation while revising for their exams or for writing their final assignment, tutors invite learners to work in teams, share their problems and find solutions to fun-loving puzzles while they try to make sense of the theories and apply them to meet challenges effectively. While they negotiate meaning with their classmates, they memorise and retain knowledge more easily getting support from their more knowledgeable peers. To sum up, the current project examined the impact of DERs on postgraduate MA Global HRM learners' academic achievement, learning attitudes, and Intercultural Intelligence Development by developing their intercultural and interlingual awareness as students tried to understand and use various cross-cultural management theories to solve real-world problems. It aimed to respond to the following research question:

- What are postgraduate students' perceptions of the impact of the use of a DER as an inclusive strategy that can increase learners' academic performance, develop their intercultural awareness, and improve their attitudes towards learning in Management Education?

2.   Methodology

The current study used a mixed-methods approach and a semi-experimental design. 80 postgraduate (MA Global HRM) students took part in this project. Participants were chosen randomly, and learners were predominantly multilingual and multicultural local and international students, aged 22-40. They formed two large mixed ability groups which were taught by the same tutor. Learners attended a module on Intercultural International Business Management in a hybrid mode for one academic term (12 weeks). The majority of the students were international (85%) who spoke English as a second or third language and came from various mixed cultural and linguistic contexts. The principal goal of this intervention and this module was to enhance learners' writing, negotiation, collaborative, and research skills so that they could successfully write their final assignment combining various theories of the module, reflecting on a real-world problem and finding the best possible solution. The overall aim was to increase student engagement, promote student reflection, development of their critical thinking skills and interaction thus enhancing these students' learning attitudes in HE and their negotiation skills in the post-Covid-19 era which traumatized and isolated students in tertiary education (Meletiadou, 2023b).

Participants in this study attended a 3-hour session every week in terms of this module on Intercultural Business Management, were taught various cross-cultural management theories and worked in various case studies in teams of 3-4 learners to reflect on the topic they would choose for their final assignment and how they would resolve a challenge using the theories they have learnt. Students found it hard to understand and remember all the theories they had learnt. They needed help and support, and the use of this DER would prepare them to work independently in order to prepare their final assignment (100%) which was due 3 weeks after the end of the semester.

Students were invited to participate in a DER task in week 11 to help them revise the theories, understand and retain them so that they could use them successfully in their final assignment. This fun-loving game offered students the opportunity to work in small teams, negotiate meaning and better understand the theories they had learnt i.e., by matching the major theorists with the right concepts and definitions. This was merely a preparation before writing their individual assignment in terms of which they had to provide a solution to a real-world problem by using the right theories thus providing an evidence-based response to the problem posed by the assignment question.

All students were taught by the same lecturer using the same material in terms of an Intercultural Management Module. In terms of this module, the researcher first taught the theories building on students' previous knowledge and then invited learners to work in groups on case studies to apply the theories in various contexts and face a number of problems. In terms of the final assignment (100% of the assessment for this module), learners had to act as consultants and offer plausible solutions to the company (advocacy) in the specific context included in the case study to assist them in facing the challenges and resolve their real-world problems which were closely related to Global Human Resource Management. In the end, to help them effectively revise all the relevant theories and engage them in successful retention of the most important concepts of the module while they were preparing their final assignment on a chosen topic (different for every student), the tutor decided to design a DER task to surprise the students and help them relax while having fun in terms of a multicultural and multilingual group. The tutor called this DER "Escape

Unconscious Bias - Enhancing HRM leaders' Intercultural and Interlingual Intelligence". The goals of this DER activity can be seen in Figure 1.
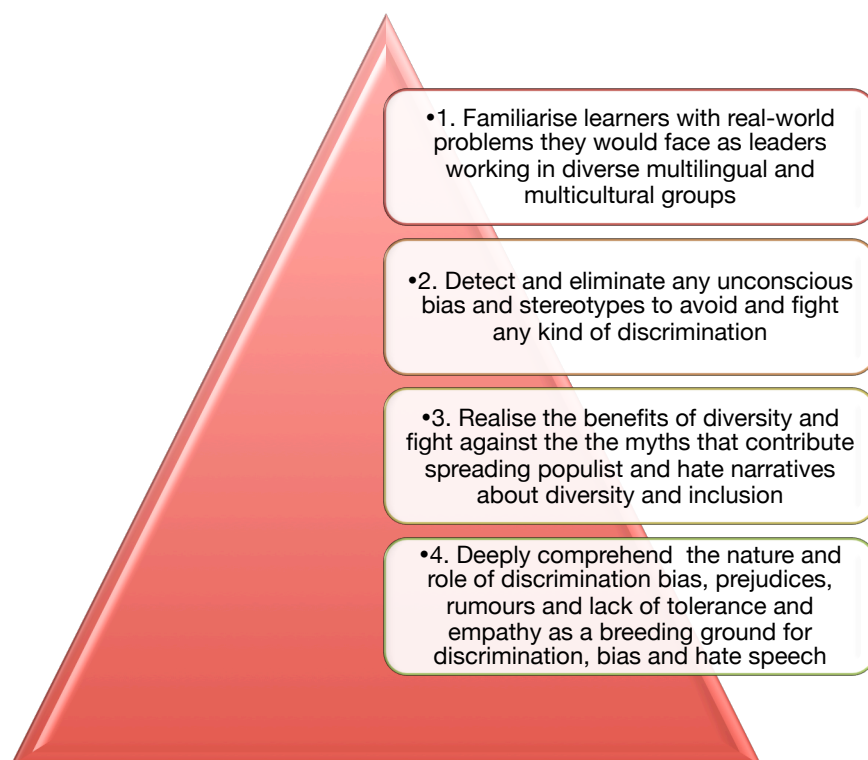
Figure 1: Goals of the DER task

"Escape Unconscious Bias" was an online highly interactive, playful game designed and piloted to contribute to enhancing HRM leaders' intercultural skills and engage them in building unconscious bias-free communities of global HRM leaders who promote empathy, tolerance, and inclusion. Gamers had to solve a series of tests/questions related to the knowledge of human rights, unconscious bias, and discrimination, and find effective solutions to thought-provoking and hard to resolve problems and situations provoked by unconscious biases, rumours and stereotypes, so to understand how they work and which strategies are most efficient to reduce, if not eliminate, their negative impact.

Escape Unconscious Bias was an amazing fun-loving approach to enhancing learners' intercultural awareness and communication in an amusing way while also allowing them to prepare their final assignment in a stress-free environment. In terms of this DER, learners were asked to match definitions of major concepts with the theorists who developed them, go through short case studies in small groups and reach a consensus about the most appropriate recommendation they could offer as consultants, find the words (major intercultural management concepts) in a crossword when the answers would reveal a scrambled word that should then be unscrambled and used as a code, and find their way in a maze that the tutor created by typing a phrase (the definition of a theory). The tutor asked a question and gave clues to the participants to find their way out of the maze. Gamers were informed and invited to engage in the DER activity via an email and were asked to work online in groups of 4 to play the game. The teams had three hours to escape the room and were invited to provide anonymous feedback via Mentimeter and write a final individual report reflecting on their

experience when they submitted their assignment indicating whether they thought the DER was a useful experience or not and why.

In terms of their DER team activity, learners were encouraged to translanguage, that is to use words or small phrases from their own native language in their verbal exchanges, but to provide their main answers concerning the DER in English (English as a Lingua Franca) as this would enable international students to become more actively involved in conversations and better comprehend the game and the concepts used (Meletiadou, 2023a; 2022). The researcher also triangulated the data provided by the participants with the tutor's observations. This allowed a more in-depth exploration and qualitative triangulation (Flick, 2018) with the findings from participants' reports. Qualitative data from student feedback via Mentimeter and students' reports were analysed in QSR NVivo 9 by the researcher. The researcher analysed all data using thematic analysis (Nowell et al., 2017) to identify patterns in the data and use these themes to find answers to the research question. She also had an assistant who analysed 20% of the data, which were chosen randomly, to increase the reliability of the analysis. The researcher and her assistant identified and agreed on themes which provided a response to the research question of this study.

3.   Findings

The researcher analysed all findings taking into consideration the research question of the current study and detected the following dominant themes which were referred to by more than 50 students and were also included in the tutor's observations.

3.1.   Perceived Impact of DER on Students' Academic Performance

Participants in the present study testified that this task helped them delve deeper into the theories, ask questions about certain points that seemed obscure and better understand how they could apply them in practice (Figure 2). Students seemed unwilling to share their problems with the tutor and more willing to discuss them with more knowledgeable peers. The DER task offered the right space and abundant time for learners to share their concerns and use the new concepts in several real-life contexts leading to learning gains, improving their critical thinking skills, time management, interpersonal skills, resilience, problem-solving and creativity considerably (Adams et al., 2018; Foster & Warwick, 2018; Walsh & Spence, 2018). This innovative learning strategy had a very positive impact on their revision skills as they prepared their final assignment which required them to apply several of the new theories they learnt in real-world circumstances. It therefore supported students' sustainable learning development confirming previous research (Kinio et al., 2017). Students confessed that their performance, as indicated by their final assignment marks, improved by up to 25%. This was confirmed by their tutor who compared their marks with other assignments they wrote for similar modules.

"I used to hate writing assignments and playing games. So many theories to revise, so little time and no support. This playful task was an opportunity to better understand new concepts and associate them in a creative way in our final assignments using our own negotiation, critical thinking, and problem-solving skills. Amazing way to foster participants' sustainable learning development.... I believe students really need that as we gradually develop our soft skills to become highly competent leaders working in major multinational companies."
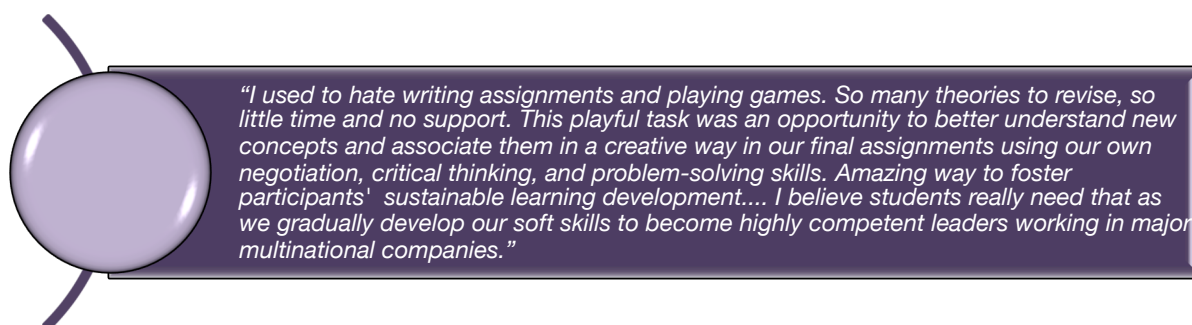
Figure 2: Impact on Students' Sustainable Learning Development

Students also noted that DERs facilitated their own understanding of their final assignment tasks and instructions as they could receive valuable support and guidance from their peers. This enhanced their group efficacy during the game (Bandura, 1997) and their individual performance (increasing their self-reliance) in their final assignment. They all seemed to have exchanged ideas and offered some kind of help and support to their peers. This contributed to improving everyone's academic performance offering either ideas, knowledge, complementary insights, their keen eye for detail or for the identification of problems in their way of thinking or in their written texts. All students were happy and deeply involved in the game. In fact, they asked for more DERs in other modules as well as these combined enhanced learning, bonding, and peaceful collaboration among students.

"I could not believe my eyes…I never enjoyed spending time with my peers on an assignment before. This was an an opportunity to get to know my peers more and better understand the major theories of the module. We all helped each other and contributed equally to complete this game successfully. I helped my peers detect problems in their writing and they were able to help me better understand some dark points in the theories which did not allow me to use them efficiently in their final assignment. This was the first time I realised there are so many solutions to the same problem as people view the problem from different perspectives. Incredible gaming experience."

Figure 3: Development of Students' Collaborative Skills

Nevertheless, few participants also confessed that they were sometimes minor conflicts among some of their peers as some local students wanted to dominate the conversations. Students admitted that these were quickly resolved by the tutor who closely monitored the whole procedure, but participants claimed that the use of specific written commonly agreed among students and the lecturer rules would ensure that all students had equal involvement and contribution in the DER.
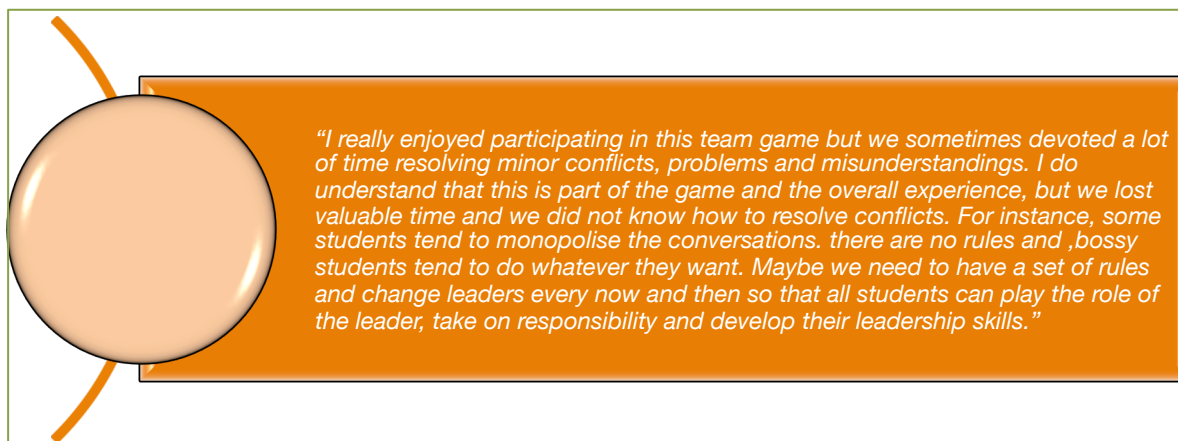
Figure 4: Conflicts About Equal Contribution

To sum up, participants in this study referred to countless benefits for students involved in DERs but they also offered several suggestions and ideas to improve the overall implementation of DERs in Management Education.

3.2. Perceived Impact of DER on Student Engagement and Development of Intercultural Intelligence

Participants repeatedly remarked that they felt inspired and relaxed with this new highly interactive and collaborative game as it fostered cooperation, intercultural communication, and negotiation while gamers tried to understand the underlying concepts and theories and use them effectively for their final assignment. They confessed that this DER increased their interest in the module, their engagement and improved their learning attitudes. This confirmed previous studies (Ho, 2018; Peleg et al., 209; Zhang et al., 2019) which also examined the application of DERs in HE, stressing the multiple gains it may offer to students. As indicated in students' feedback, this digital game-based strategy increased students' intercultural intelligence while fostering Social Justice.
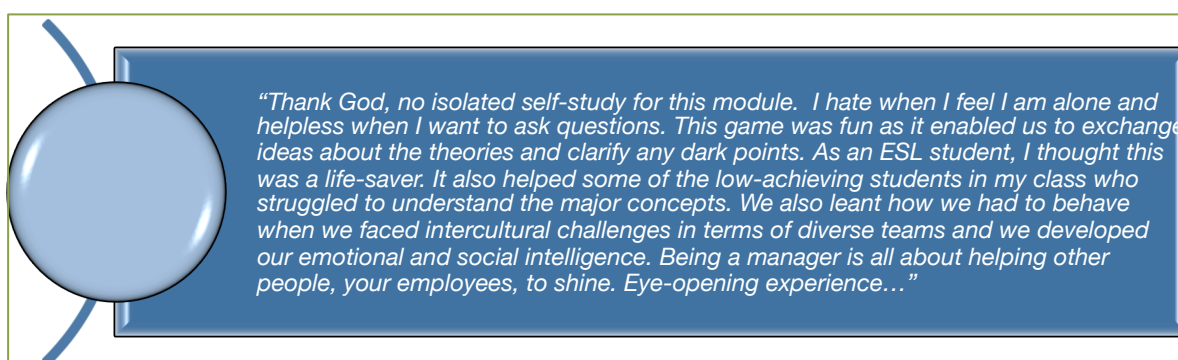
Figure 5: Increased Level of Engagement and Interaction

However, some local students confessed that certain international learners created groups with their peers, with who shared the same native language, using their mother tongue rather than their target language (English) as they could not understand local students who spoke either too fast or used phrases or words they could not understand. Moreover, they felt intimidated and ashamed to express themselves in English and contribute their own ideas to their group. Local students quickly realised that and showing understanding and empathy

decided to talk more slowly and allow their international colleagues to contribute by offering them the first turn in every conversation showing intercultural intelligence and promoting inclusion. This helped them to prepare themselves as they would face similar challenges as managers in multinational companies in the future.

"I think DER was a life-changing experience for all of us. However, some students created groups with their friends and talked in their native language. They could not undersantd local students and it was easier for them to avoid interacting in English. I interevened right away asking my classmates to talk more slowly. I also offered international students the first turn when all of us had to contribute our ideas. My patience and support helped them and ultimately helped me finish the game faster as they had brilliant ideas. We also praised these students for their contributions. Incredible experience! We developed our problem-solving and decision-making skills as well as our tolerance. We have to, if we want to lead international teams and bring in innovative ideas in the future."
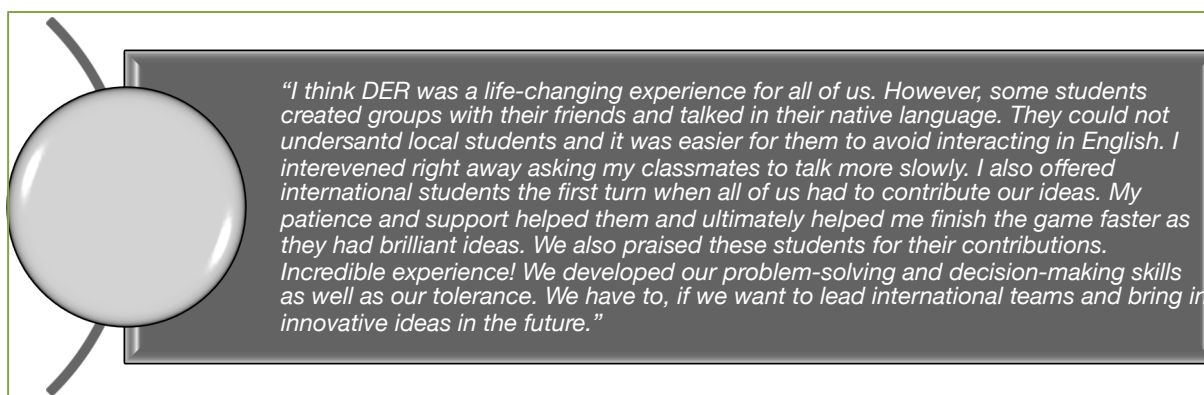
Figure 6: Empathy and Development of Students' Intercultural Intelligence

To sum up, the findings from the present intervention showed that learners enjoyed these fun-loving games as they thought the whole experience was inspiring and valuable for their future academic, personal, and professional development. Students developed various valuable professional skills, i.e., interpersonal skills, decision-making and strategic thinking and prepared themselves and their peers to become successful leaders by showing empathy and tolerance developing their intercultural and emotional intelligence and becoming more inclusive. They thus promoted Social Justice supporting their peers, irrespective of their background, tastes, needs and preferences. They did face some minor challenges, but they confessed they had to develop important skills i.e., emotional, cultural, linguistic, and social intelligence if they wanted to succeed as leaders in their future workplaces around the world.

4. Conclusion

The present intervention showed some of the gains and shortcoming of involving students in DERs while preparing them to become successful leaders and work effectively in terms of multinational and multicultural teams at their workplace. Working in terms of a multinational team can be quite challenging for the members of the team, but also for the leader of this group. As part of extended multinational and multicultural teams, members need to reach specific aims and goals and establish a common purpose, clarify the roles played by various participants to avoid conflict, and agree on specific rules for conduct, effective collaboration, and interaction (Earley & Gibson, 2002). This was also evident in terms of these learners' participation in the specific DER activity. Gamers disclosed these as some of the problems they faced and had to resolve to facilitate interpersonal communication and reach their final goals successfully so that they could complete the game and compete with their peers effectively.

The current project has many limitations and offers directions for further research. Initially, many factors that were not tested in this study might have influenced either positively or negatively these learners' attitudes towards DERs. For example, the impact of DER on student academic performance could have been assessed more reliably via a digital test or a face-to-face quiz given prior and post intervention, comparing the knowledge acquired by the research group and another group which would act as a control group. This would have

enhanced the reliability of our findings and claims about the impact of DERs on students' academic performance.

Moreover, the self-report features of this study could be enhanced by quantitative tools elaborating on the links between various characteristics of the intervention, i.e., impact on students' writing performance in their final assignment, impact on students' oral fluency etc. Further studies may benefit from interviews with participants eliciting their experiences with the use of DERs and revealing the impact of challenge for instance, or the mediation of cooperation between DER tasks and learning motivation. Interviews with tutors and observations of teaching via DER could be beneficial for understanding the pitfalls of the approach and the problems tutors may face when implementing DERs in class, whether online or face-to- face. Finally, the current project focused on postgraduate HRM students. Future studies could explore DER impact on undergraduate or foundation students and/or students in other courses, i.e., Digital Marketing, Law or International Management and compare their findings.

The need for gamers to collaborate in a time-specific but enjoyable context allows students to develop valuable interpersonal skills; it may also reduce the "free-rider" issue (i.e., students who take advantage of the gains, but do not contribute to the groupwork), which is one of the most significant challenges tutors and learners face in terms of traditional team-based learning tasks. Additionally, DERs provide an opportunity to bring technology to the classroom, as simulations, videos, or other interactive digital material can easily be combined with the various puzzles of any DER activity. Creating puzzles that meet the learning objectives and enable students to engage with the theories of the module, instead of just searching for clues, requires time, patience, the right context and critical thinking skills. Once the game has been designed though, it can be used repeatedly in forthcoming years, other modules and or courses. Any successful use of DERs should include pilot testing in order to estimate the time required to complete the digital game and to detect any challenges and/or mistakes that could prevent successful implementation of the game and successful completion. This would also develop tutors' confidence in supporting participants to complete the activity successfully.

During learners' participation in any DER task, the debriefing stage is their only chance for reflection; without reflection, experience cannot lead to long-term effective learning and retention of learning. Surprisingly, less than half of the studies conducted so far on DERs included debriefing in their escape room experience and only one fifth included details of the implementation process. Further projects incorporating debriefing with more rigorous evaluation are necessary to confirm the educational value for various designs, different kinds of content, and in various contexts. More research is also necessary to begin to gauge the "return of investment" of time, effort, and resources in relation to the achieved results. To sum up, the current study intends to contribute to instructional education design by providing additional evidence of DER's potential to support student learning experience in HE. The outcomes may extend the road map for future research, offer new insights to researchers and educators, and provide tutors with significant and valuable advice and recommendations on how to add DERs into their classes. Finally, it may indicate educational approaches to support the development of students' writing skills and enhance students' learning experience fostering Social Justice and Sustainable Development.

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A Study of the Termination of Undergraduate Students Status
in the Faculty of Science and Technology, Thammasat University, Thailand

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Abstract

The objectives of this research were to study the survival function, median survival time, and hazard function of the termination of undergraduate students in the Faculty of Science and Technology, Thammasat University, Thailand. Moreover, we aim to compare the survival time of termination of student status classified by curriculum, gender and domicile. Secondary data of 624 students were collected by the office of Registrar, Thammasat University. The research results showed that the undergraduate students of the Faculty of Science and Technology had the highest risk of termination of student status equal to 0.18 in the second semester of the 1st Year. This may be caused by students dropping out to take entrance examinations at other universities because they received a cumulative grade point average lower than the level specified by the university. Some students did not like their field of study. Finally, when boredom occurs, they use the method of changing their field of study or changing universities. The median survival time could not be determined because there were no cases where half of the students lost their status during the study period. When comparing the survival time of termination of student status classified by curriculum, gender and domicile. It can be found that students in each curriculum had a significant difference in the survival time of termination of student status ($P\text{-value} = 0.005$). Male and female students had no difference in survival time of termination of student status ($P\text{-value} = 0.393$) and students residing in Bangkok and other provinces had a significant difference in the survival time of termination of student status ($P\text{-value} = 0.034$).

Keywords: Termination of Student Status, Survival Analysis, Thammasat University

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Introduction

The termination of student status means an event in which a student has to leave the university before graduation. It is considered a "Wasting investment in education" because the education a budget comes from the people's taxes. Thailand allocates budget for education at a high rate and it is expected that in the future it will continue to increase, while the quality of the output of the education system continues to decline. In addition, the termination of education also causes losses in other areas such as loss of expenses, people, and materials for education. And most importantly, it is discouragement, wasted opportunities, and wasted time. Therefore, universities need to focus on developing and improving education management to have quality and standards. If an educational institution can provide education with quality standards and low cost of education Inevitably shows that educational institutions are able to manage education to meet the needs of society.

The purposes of this research are to find the survival function, median survival time and hazard function of the termination of undergraduate students status (4-year program) of the Faculty of Science and Technology, Thammasat University, and to compare the survival time of termination of student status classified by curriculum, gender and domicile.

Research Methodology

Data Collection

The information of 624 undergraduate students in the Faculty of Science and Technology, Thammasat University (4-year program: Graduating in the academic year 2020) including curriculum, gender, domicile, average grades at the high school and average grades before the termination of student status were collected by the office of Registrar, Thammasat University.

Survival Analysis

Survival analysis is a statistical technique that studies the timing of a critical event of an event of interest. It is to track the occurrence of an event for a certain period of time to observe whether the event of interest will occur or not. The event of interest may be illness, recovery, death or unemployment (Hosmer, Lemeshow, and May, 1999), etc. The period until the event is called "Survival time". The analysis therefore uses a percentage or the rate of occurrence of such events which often has incomplete data (censoring observation) due to many reasons, for example, the duration of the research is limited, causing some sample units to have events of interest after the end of the study; some units lost follow-up from the study for unknown reasons (Dancey, Reidy and Rowe, 2012).

In the survival analysis, there are two functions that are of interest to study, namely the survival function ($s(t)$) and the hazard function ($h(t)$).

1) The survival function: $s(t)$ is the basis of survival analysis, indicating the probability that an individual survives after time t. where each sample survives longer than the time point t or the likelihood of an event occurring after time t, as the equation.

$$s(t) \ = \ P[T \ > \ t] \ ; \ t > 0$$

At $t = 0$, the value $s(t) = s(0) = 1$ because no one has yet occurred. In other words, the probability of survival. or probability of survival or probability of event-free at the beginning of the study is 1.

At $t = \infty, s(t) = s(\infty) = 0$ because no one survives. Everyone has an incident that is, the probability of survival. or that which has not yet occurred when the study period is infinite is equal to 0.

2) Hazard Function: $h(t)$ is the ratio between the probability of an event occurring at time t $(f(t))$ to the probability of survival at time t. That $(s(t))$, with survival until then or the likelihood of an event of interest occurring at time t without the event occurring until that time. It is a conditional probability.

$$h(t) = \lim_{\Delta t \to 0} \frac{P(t < T \leq t + \Delta t \,|T > t)}{\Delta t}$$

t = beginning of time of interest in the study
T = end of study time
Δt = the absence of an event in the period $t - T$

$$h(t) = \lim_{\Delta t \to 0} \frac{P(t < T \leq t + \Delta t)}{\Delta t} \times \frac{1}{S(t)} = \frac{f(t)}{S(t)}$$

$$h(t) = \frac{f(t)}{1 - F(t)}$$

Survival Analysis: *Kaplan-Meier Estimate*

It is a method of estimating the conditional probability of the time an event will occur. The Kaplan-Meier model is based on estimating the conditional probability at each time point at which the event occurs. It starts with the survival times being arranged in ascending order. At the beginning of the study at t = 0, the event of interest has not yet occurred, so the probability of the event of interest is equal to 1. The event of interest can be estimated as follows:

$$\hat{s}(t) = \prod_{t_i \leq t} \frac{n_i - d_i}{n_i}$$

$\hat{s}(t)$ = probability of occurrence of the event of interest at time t.
n_i = number of exposures to risk factors
d_i = number of events
i = sequence of events at any time t

Survival Analysis: *The Log Rank Test*

Log-rank test is a hypothesis test to compare the survival distributions of two samples. The log rank test is a popular test to test the null hypothesis of no difference in survival between two or more independent groups. The test compares the entire survival experience between groups and can be thought of as a test of whether the survival curves are identical (overlapping) or not.

The statistics used for testing are $\chi^2_{cal} = \sum_{i=1}^{k} \frac{(O_i - E_i)^2}{E_i} \sim \chi^2_{\alpha, k-1}$

where k is the number of sample groups used for comparison.

For this research,

Survival time means the time when students start to study in the regular undergraduate program, 4-year program (Academic year 2017 to 2020), Faculty of Science and Technology, Thammasat University until the event of termination of student status.

Event means an event that occurs.
The value is 1 when it is an event of interest to study (termination of student status).
The value is 0 when it is a censored case.

Termination of student status means an event in which a student has to leave Thammasat University before graduation as specified by the curriculum for any of the following reasons : 1) Lack of qualifications or prohibited characteristics of being a university student 2) His name was withdrawn from the student register 3) The study period as specified by the regulations or the curriculum requirements has passed 4) Resign from being a student 5) Being subjected to severe disciplinary action to the extent of expulsion from student status 6) Died 7) Failure to register within the period specified by the university and did not request a leave of absence within 30 days from the opening date of that semester.

Censored case means the case where a student has completed a 4-year curriculum or has graduated but took more than 4 years to study.

Result

Semester	Number Entering Interval	Number Withdrawing During Interval	Number Exposed To Risk	Number of Terminal Events	Proportion Terminating	Proportion Surviving	Cumulative Proportion Surviving at End of Interval	Standard Error of Cumulative Proportion Surviving at End of Interval	Probability Density	Standard Error of Probability Density	Hazard Rate	Standard Error of Hazard Rate
0	624	21	613.5	0	0	1	1	0	0	0	0	0
1	603	0	603	29	0.05	0.95	0.95	0.01	0.048	0.009	0.05	0.01
2	574	0	574	97	0.17	0.83	0.79	0.02	0.161	0.015	0.18	0.02
3	477	0	477	27	0.06	0.94	0.75	0.02	0.045	0.008	0.06	0.01
4	450	0	450	13	0.03	0.97	0.72	0.02	0.022	0.006	0.03	0.01
5	437	0	437	4	0.01	0.99	0.72	0.02	0.007	0.003	0.01	0
6	433	0	433	3	0.01	0.99	0.71	0.02	0.005	0.003	0.01	0
7	430	0	430	7	0.02	0.98	0.7	0.02	0.012	0.004	0.02	0.01
8	423	1	422.5	2	0	1	0.7	0.02	0.003	0.002	0	0
9	420	0	420	1	0	1	0.7	0.02	0.002	0.002	0	0
10	419	2	418	0	0	1	0.7	0.02	0	0	0	0
11	417	0	417	1	0	1	0.69	0.02	0.002	0.002	0	0
12	416	416	208	0	0	1	0.69	0.02	0	0	0	0

The median survival time was not determined.

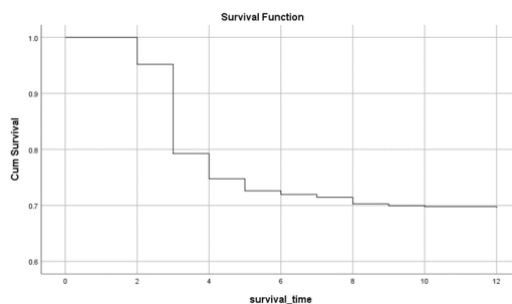Table 1: Life table of Science and Technology undergraduate students

Figure 1: Survival function of Science and Technology undergraduate students
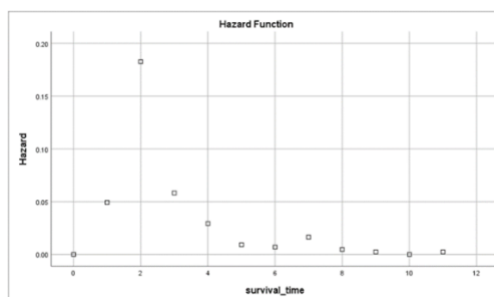

Figure 2: Hazard function of Science and Technology undergraduate students

From Table 1 and Figures 1-2, the Kaplan-Meier estimator is used to estimate the survival function. It was found that the undergraduate students of the Faculty of Science and Technology had the highest risk of termination of student status equal to 0.18 in the second semester of the 1st Year, and there was a chance that students would remain as students longer than the second semester of the 1st Year equal to 79%. It was also found that the median survival time could not be determined because there were no cases where half of the students lost their status during the study period.

Log-rank Test	Chi-Square	df.	P-value
Curriculum	29.769	13	0.005
Gender	0.731	1	0.393
Domicile	4.504	1	0.034

Table 2: Log Rank Test classified by curriculum, gender and domicile

From Table 2, it was found that there were significantly different survival times of termination of student status between students for each curriculum and domicile (P-value = 0.005 and 0.034, respectively). Male and female students had no difference in survival time of termination of student status (P-value = 0.393).

Figure 3: Survival function of Science and Technology undergraduate students classified by curriculum

From Figure 3, it was found that the top 3 curriculum with the highest cumulative proportion of students survival at the end of time were Computer science, Statistics and Environmental science. The last three subjects with the lowest cumulative proportion of student survival at the end of time were Biotechnology, Applied Mathematics and Physics.

Figure 4: Survival function of Science and Technology undergraduate students classified by gender

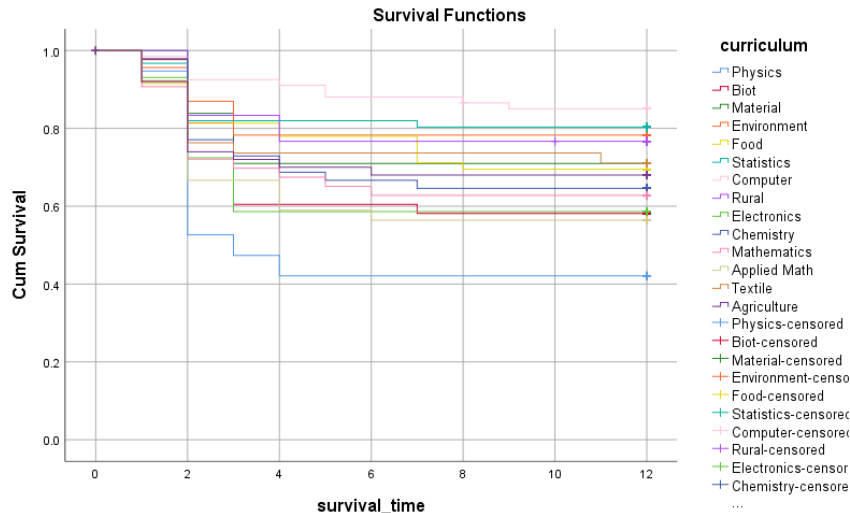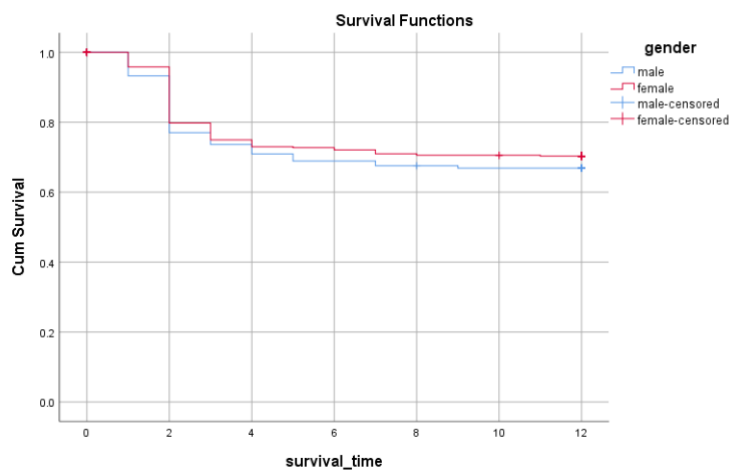From Figure 4, it was found that male and female students had no difference in survival time of termination of student status.
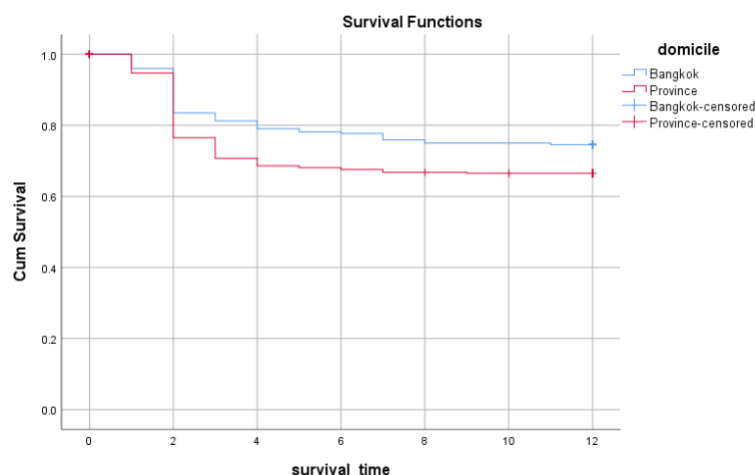
Figure 5: Survival Function of Science and Technology undergraduate students classified by domicile

From Figure 5, it was found that students residing in Bangkok had the cumulative proportion of survival higher than students who domiciled in other provinces.

Conclusion and Discussion

The undergraduate students of the Faculty of Science and Technology had the highest risk of termination of student status in the second semester of the 1st Year. Students majoring in Physics, Materials Science, Food Science and Technology, Statistics, Computer Science, technology for sustainable development, Physics Electronic, Chemistry, Mathematics, Applied Mathematics, Textile Science and Technology and agricultural technology have the highest rate of danger of losing student status in the second semester of the 1st Year, biotechnology and environmental science students have the highest rate of danger of losing student status in the third semester of the 1st Year. Furthermore, curriculums and domiciles influence the termination of student status.

From the analysis results, it was found that students have the highest risk of losing student status in the second semester of the first academic year, which may be caused by students dropping out to take entrance examinations at other universities or other faculties that are more interested in or take the entrance examination to become a new student again in the same field of study due to academic performance below the criteria. There are many students who do not have a goal of what field they want to study or what is the motivation for studying. Some students have no purpose in learning. Finally, when boredom occurs, they use the method of changing their field of study or changing universities. In order to resolve such problems, the faculty may offer career guidance related to that field of study for students to aim in their studies. In addition, there should be activities to adjust the basic knowledge of the basic subjects of that field for first-year students for students to have better academic results. It is also a way to reduce the problem of losing student status of students as well.

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Exploring the Impact of Teaching Design History on Creativity and Intrinsic Motivation: Curriculum Design and Learning

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Abstract

The history of design is a basic course for design majors in universities all over the world, and is usually taught in a purely theoretical way, This study adjusts the form of teaching, changing the original "linear lecture"-based teaching to an exploratory teaching method centered on "design styles", using styles as the origin to guide students to radiate their learning of the temporal and spatial backgrounds, developmental reasons, representative figures, social influences, etc., and attracting them to explore the relevant knowledge through the stylistic manifestations of the designs, as well as superimposing their personal understandings of design styles to be applied to the practice of icon design. A total of 30 students participated in this study to examine the effectiveness of the teaching: a statistical T-test comparing the pre-study and post-study results confirmed that the "style-centered" approach was beneficial to students' creativity and intrinsic motivation, which means that the approach is effective in teaching design history; In addition, this study used linear regression analysis to understand the relationship between creativity and intrinsic motivation, and the results showed that creativity had a more pronounced positive effect on intrinsic motivation through "style-centered" design history learning. Lack of motivation is a pain point in history courses, but the style-centered approach to teaching design history has been proven to be useful, and future history classes should take students' learning mindset and desire into account to stimulate their enthusiasm for learning.

Keywords: Design History, Design Teaching, Intrinsic Efficacy, Creativity, Teaching Methods

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Introduction

One of the foundational required courses for design majors is history of design. The content of the course typically covers a range of topics, from the ancient civilization to the modern design movement, with the goal of supporting students in understanding the approaches, expressions, and meanings of design modifications, and also enhancing their professional growth and improving their design ability. Nonetheless, there are two main issues with the way design history is taught today: first, there is a disconnect between theory and practice; rather than emphasizing the ability to apply knowledge to practice, teaching frequently concentrates on introducing historical individuals, categories, and styles; second, the design style is out of date; design history education emphasizes "historical content" rather than having a strong connection to contemporary design content. The "historical content" that is taught in design history classes is prioritized over the contemporary design content. These two issues make it difficult for students to apply their understanding of design history to the development of their abilities and limit their ability to consider potential future trends in design. Students thus raise two concerns about the value and efficacy of design history courses: Would we really benefit from taking a course on the history of design? Which talents are enhanced by studying design history?

Literature Review

Learning Traits for Novices in Design

When it comes to students' cognitive approaches, thinking development, and performance characteristics, design differs from the learning characteristics of basic disciplines as a cross-disciplinary field that places an emphasis on practicality. The main approach to learning of design students is the "right-brain" perception of knowledge, and studies indicates that visual learners prefer to learn through images, icons, videos, movies, and other media (Demirkan, 2016; Demirkan and Demirbas, 2010); However, rather than emphasizing conceptual understanding and theoretical frameworks, novices in design are more engaged with visual style, that is, learning about proven facts and tangible materials (Demirkan, 2016). Second, a key learning characteristic of design students is their propensity for group discussion over independent thought, which is brought about by "interactivity" and plays a significant role in the process of acquiring new knowledge. Schon (1983) suggests that the process of "thought from action" is crucial to learning and that the learning experience is founded on self-reflection, defining the learner as an active practitioner. Schon (1983) studied design workshops as a mode of learning. Learning is facilitated by the "reflection from action" process. For those who are new to design, "active reflection" is an ability that needs to be built, and designers also need to possess it. Teachers should help students cultivate a sense of reflection and acquire the ability to reflect early in their design learning (Demirbas & Demirka, 2003). Students show the best learning when they evaluate the outcomes of their studies or work, and expert assessment supports their professional growth (Demirkan & Demirbas, 2008). Following the completion of the designs by the students, the experts provide professional feedback on the work's creation, which prompts further contemplation from the students; Furthermore, the reflection arising from "presentations" is an essential aspect of reflection as well. Through comments and discussions, groups can improve the quality of their practice by sharing ideas while also allowing teachers and students to discuss the same content in different ways (Demirkan, 2016).

According to earlier research, students studying design rely on their right brains to perceptual learning and are more likely to learn new information through group projects and discussions. With the main objective of fostering active, collaborative, and reflective learners, this study aims to investigate the history course's teaching methods based on the learning characteristics of design beginners. The core content of the study is to enhance students' creative self-confidence and intrinsic motivation in design professional knowledge.

Creativity

One of the most essential components of design work is creativity, and those who practice design are also practitioners of creativity, which serves as a major source of inspiration for new designs, and the assessment of creativity is especially crucial. In general, the expert consensus method—which involves first establishing a basic consensus and then evaluating the works in accordance with the criteria of individual experts, including professional knowledge or skills, style or strategy, individual attitude or preference, and logical cognition—is a common assessment method for evaluating the creativity of individual works (Albert & Runco, 1999; Amabile, 1996). Csikszentmihalyi (1997) expanded the scope of creativity assessment through the systematic perspective of creativity, which defines the source of creativity as the process of interaction between the individual and the environment. According to this perspective, creativity should be professionally assessed according to the three levels of individual, domain, and field. The term "creative self-efficacy" refers to the degree to individuals have faith that they can create innovative products. It was coined by Tierney and Farmer (2011) and is a combination of the theory. Based on this, Hung and Lin (2004) analyzed self-efficacy in creativity primarily through the lens of the various aspects of design practice, such as the three dimensions of creative product convictions, creative thinking beliefs, and fending off unfavorable assessments. The higher the overall score, the more self-efficacy in creativity. It is critical for individuals, organizations, and society as a whole to evaluate creativity. In addition to helping to evaluate and enhance the design quality of projects or products, the assessment of creativity is linked to design practitioners' recognition of their own creative potential. It also facilitates the most efficient use of social resources and fosters sustainable innovation and development thinking. Thus, the evaluation of creativity is crucial for talent development, professional research, and even the improvement of creativity in this industry.

Intrinsic Motivation

"Motivation" is regarded as a component of creative personality traits and is closely linked to creativity (Weiner, 1972). Conversely, intrinsic motivation describes a person's attitude toward completing a task out of personal curiosity or enjoyment. It includes the expression of competence, spontaneity, autonomy, interest, and enjoyment (Amabile, 1993; King, Walker, & Broyles, 1996). According to Glynn & Webster (1992) and Csikszentmihalyi (2000), design students are more likely to be interested in learning and creating in a group setting. Co-learning can foster creative motivate and concentration, and designers can be intrinsically motivated by a sense of fun in the process, which further prompts curious exploratory behaviors.

The theory of self-efficacy, which is concerned with an individual's assessment of whether or not their abilities match expected outcomes, typically dominates the assessment of intrinsic motivation. Similar to creative self-efficacy, self-efficacy is to look at how confident an individual is in a certain skill. According to Bandura (1999), an individual's self-efficacy is

typically influenced by the outcomes of their accomplishments in relation to their past achievements, alternative experiences that gauge their self-efficacy by comparing or observing themselves to others, and oral persuasion brought on by the opinions of others of their abilities in the social environment. Physical or emotional conditions in which the person evaluates their ability to reach goals in light of those circumstances or emotions, for a total of four influences. The robust correlation observed between intrinsic motivation and creativity highlights the significance of intrinsic motivation in creative endeavors, and scientific evaluation contributes to the comprehension and promotion of creativity.

Research Methods

Organization of the Course

Three stages constitute the course: pre-course planning, in-class instruction and feedback, and evaluation of course outcomes. In order to compare the efficacy of the self-assessment of the study of design history, the teacher selects "urban icon design" as the assessment topic in a national design competition during the pre-course preparation stage. The teacher then focuses on explaining the goals and focuses of the creation of this topic, and the students are required to fill out a subjective evaluation questionnaire dominated by creativity and intrinsic efficacy after completing their work.

This course's main priority is on design styles as a teaching and learning tool during the lecture and discussion sections. This is caused by two factors: first, the learning mentality of novices who wish to rapidly establish a certain style to demonstrate their professional skill; and second, the BTS teaching model, which promotes teachers guiding students and enhancing their investigation of information. Professor Yeh's "BTS Teaching Method" is based on the "Understanding + Guiding + Observing + Learning" teaching model, which emphasizes that teachers should give students opportunities for self-directed learning, teach them how to recognize and solve problems, and teach them how to learn through peer-to-peer learning in order to develop their capacity for thought, expression, and facing uncertainty (Yeh, 2018). Students are encouraged to investigate the theory underlying the knowledge points and the capacity to develop the theory by incorporating it back into their design work by using design styles as a starting point to increase learning interest. The major design styles and representative designers—Bourbon and Baroque/Rococo, Morris and Arts and Crafts, Mouchaux and Art Nouveau, Dunant and Art Deco, Corbusier and Bauhaus, Mondrian and De Stijl, Hockney and Pop Art, and Soutozas and Memphis—are combined in the course content, which also combines the idea of stylistic stimulation. The instructor begins each session with a slide show of classic designs from each design style to provide students a visual boost and basic knowledge of the works.

Students engage in exploratory, collaborative learning within the framework of the BTS teaching framework is the second primary target of classroom instruction and feedback. Beginners in design are guided to understand the ideas underlying design styles through collaborative work and teacher support in this course. Through active exploration rather than passive indoctrination, students in groups of three delve deeper into their understanding and awareness of the styles surrounding the contemporary background, reasons for development, social influence, representative figures, design ideas, and classic works; Depending on how well their studies are going, the teacher will pose pertinent questions to the students in order to help them expand the scope and depth of their research. Teacher will also offer advice to any groups who stray from the intended topic. The teacher will summarize the design

concepts of the time, which will act as a reminder of the past and the future—that is, finishing one of the items in the classroom feedback—when the students organize their study of the style into a learning report and present it orally at the start of the next lesson.

Supporting students in applying what they have learned to design practice—which culminates in a second iconography project with a competition serving as an effectiveness test—is the third main goal of teaching and feedback. Although there is no restriction on the extent of style imitation, the concept and style of the second icon design may differ significantly from the first. Once the students have completed their work, the teacher asks them to comment on each other's work in order to encourage their participation, excitement, and competitive spirit. Next, the industry experts are invited to provide an expert opinion and offer suggestions. Based on the findings of these two evaluations, the students modify their designs and submit it to the competition. Simultaneously, academic essay writing is an additional way to evaluate the efficacy of education. Every student must write a discursive essay of at least 3,000 words on design style in order to strengthen their knowledge organization, logical thinking, and critical expression skills as well as further develop their comprehension of the depth of the practical application of design style. Students are still needed to complete the same subjective assessment form from the previous round after finishing the second icon design.

Participants and Experimental Process

This study aims to conduct an in-depth investigation of the relationship between creativity and internal efficacy in order to evaluate the effectiveness of the new teaching model and the learning characteristics of design beginners, based on the confirmation that this teaching method is beneficial to the development of students' design ability. The pre-test and post-test were compared prior to and following instruction in order to perform the experiment, which was based on the self-assessment of icon design. 30 Chinese students, 10 male and 20 female, first-year university students majoring in design, ages 17 to 20, participated in the experiment, which was carried out in a normal class given by the researcher. The students underwent a design history study that was mostly centered around the BTS teaching framework over the 2.5 months that separated the pre-study and post-study icon design phases.

After finishing both designs, students were asked to provide feedback on their subjective degree of creativity and intrinsic efficacy using a 7-point Likert scale. Each of the 10 icons in the workload required by the designs took an equal amount of time to complete. Before to the questionnaire being finished, the researcher made it clear that it was to be done in person and that there were no right or wrong answers, nor would it affect the final course grade. Following data collection, the researcher utilized narrative statistics and the paired-sample T-test of SPSS statistical software to validate and draw conclusions. This allowed them to make preliminary conclusions about whether the students' design abilities differed before and after the study, and it also allowed them to explore the learning characteristics of beginning designers by using linear analysis to elucidate the relationship between creativity and intrinsic efficacy.

Questionnaire

Following the completion of the two icon designs, each student was requested to complete an exactly same subjective evaluation form that measured their degree of intrinsic motivation and creativity. This study uses the "Creative Self-Efficacy Scale" developed by Hung and Lin

(2004) as the foundational text, and the purpose of "creative self-efficacy" is to test the students' evaluation of their own creativity during the process of learning and applying design history. The wording of some of the questions is modified according to the actual content of the design history course, involving three dimensions: belief in creative products, creative thinking strategies, and resistance to negative evaluations, with a total of 11 questions. The researcher additionally evaluated the students' intrinsic feelings associated with creating icons after learning and being influenced by classical design styles using the self-stated questionnaire that Amabile (1996) proposed as a parent for measuring students' intrinsic motivation. The modified questions included four facets, namely, senses of fulfillment during the design work, degree of stress, degree of liking the work, and motivation perception, with a total of six questions. The majority of respondents finished the questions in less than three minutes, and both employed a seven-point Likert scale for subjective evaluation. The questionnaires were written in the respondents' native tongue.

Results

The results of this research evaluated how "utility" and "relationship" were used to analyze the new approach to teaching design history. The Creative Self-Efficacy Scale's Cronbach's α was 0.872, indicating that the internal consistency of the questionnaire items was sufficiently good, based on the reliability analysis of the scales. The Intrinsic Efficacy Scale's Cronbach's α was 0.666, still within an acceptable range. Consequently, statistical analysis of the information gathered from the two surveys is possible.

The Efficacy of a Novel Approach to Teaching Design History

In this study, paired-sample T-tests were used for pre- and post-study pairwise comparisons of creative self-efficacy and intrinsic motivation efficacy, respectively. Table 1 presents the findings. While the mean creativity results before and after the study were 4.939 (SD=0.568) and 5.324 (SD=0.823), respectively, the mean difference in students' creative self-efficacy before and after the study reached -0.384, and the significance reached the criterion (p=0.023, p<0.05*). This indicates that following the study of the new design history curriculum, results on the creativity self-efficacy assessment were significantly higher in the post-study than in the pre-study. The mean of the difference between intrinsic motivation efficacy before and after the study amounted to -0.486, with significance reaching the standardized value (p=0.022, p<0.05*). The mean of intrinsic motivation efficacy before and after the study was 5.040 (SD=0.741) and 5.526 (SD=0.844), respectively, indicating that the results of intrinsic motivation efficacy assessed in the post-study were significantly higher than those in the pre-study. In conclusion, the standard deviation findings of the post-study demonstrated a significant tendency to broaden compared to the pre-study for both creative self-efficacy and internal intrinsic drive.

Table 1: the results for Creative Self-Efficacy and Intrinsic Motivation Efficacy's mean and standard deviation

	Group	N	Mean	STDEV	SEM
Creative	Before	30	4.939	0.568	0.103
	After	30	5.324	0.823	0.150
Motivation	Before	30	5.040	0.741	0.135
	After	30	5.526	0.844	0.154

Table 2: Creative Self-Efficacy and Intrinsic Motivation Efficacy paired-sample
T-test results before and after learning

		Mean	STDEV	t	df	Sig.(2-tailed)
Creative	Before - After	-0.384	0.878	-2.401	29	0.023
Motivation	Before - After	-0.486	1.102	-2.418	29	0.022

The Impact of Creative Self-Improvement on Intrinsic Motivation

Exploring the relationship between creative self-confidence and intrinsic motivation is another purpose of this study, which aims to better understand the mental state of students' learning. Stepwise analysis was employed in the statistical processes using SPSS, with creative self-confidence being the independent variable and intrinsic motivation being the dependent variable.

This study phase evaluated the subjective assessment scores for the pre- and post-study independently in order to ensure the precision and comprehensiveness of the findings. Table 3 presents results. With an R-squared of 0.542, the fitted equation accounts for 54.2% of the variation observed in the dependent variable. While the unstandardized coefficient of creative self-efficacy on intrinsic motivation is 0.697 and meets the significant criterion (B=0.697, p=0.000**), the ANOVA test result in the overall evaluation for the entire model meets the significant criterion (F=68.724, p=0.000**), indicating that the fitted equation is meaningful. It suggests that intrinsic efficacy and creative self-efficacy can be positively correlated, meaning that the better the creative self-efficacy, the greater the intrinsic motivation to learn and create.

Pre-learning findings revealed a model R-squared of 0.391, meaning that 39.1% of the dependent variable in the pre-learning can be explained by the fitted equation, which is significantly less than the post-learning performance. The fitted equation was significant, according to the ANOVA test results, which also met the significance criterion (F=17.985, p=0.000**). However, the pre-learning model's F-value was significantly lower than the post-learning model's, indicating that the model's ability to explain variation in the dependent variable is not as strong as it is in the post-learning model; In final analysis, the pre-learning period's unstandardized coefficient of creativity self-efficacy on intrinsic motivation was 0.635, meeting the significance criterion (B=0.635, p=0.000**). This suggests that, even in the absence of knowledge about design history, creativity self-efficacy can positively influence intrinsic efficacy. The explanatory power of the model of students' creative self-confidence on self-efficacy increased when the pre- and post-study conditions were compared. This may mean that after learning through the new design history teaching method, students' creative self-confidence can have a greater impact on their self-efficacy.

Table 3: Model summary and results from the number of variations analysis

	R	R²	R² Adjusted	S.E.		SS	df	F	Sig.
Pre-test	0.625	0.391	0.369	0.458	Regression	3.755	1	17.985	0.000
					Residual	5.877	28		
					Total	9.625	29		
Post-test	0.736	0.542	0.534	0.470	Regression	15.188	1	68.724	0.000
					Residual	12.818	58		
					Total	28.005	59		

Table 4: Results of standardized and unstandardized coefficients

	Model	B	S.E.	β	T	Sig.
Pre-test	(Constant)	1.674	0.744		2.250	0.033
	Creative	0.635	0.150	0.625	4.241	0.000
Post-test	(Constant)	1.459	0.436		3.349	0.001
	Creative	0.697	0.084	0.736	8.290	0.000

Discussion

Design History Course Teaching Method

The study of design history is unquestionably important, but many students only recognize its significance after they have formed their knowledge framework. As a result, beginning designers are unable to devote enough time to the course due to their lack of theoretical knowledge and practical design experience. First, beginners lack skilled methods and have the learning motivation of wanting to quickly master a variety of design styles in order to show their professional ability. The classic styles shown in the early part of the course fit the learning psychology of beginners. Design students are adept at using images, charts, films, and other sensory forms of learning rather than reading through theory, so this approach can be used to enhance the attractiveness of the relevant knowledge and digging into the role. Second, collaborative exploratory learning within the BTS framework enhances most students' engagement and knowledge discussion, a phenomenon associated with design students' propensity to learn collaboratively and engage in peer discussions (Demirkan, & Demirbas, 2008; Demirkan, 2016); In order to become a guide rather than an indoctrinator of the theoretical construction, the teacher also assumes the role of a coach. This involves paying close attention to the students' performance and feedback during the collaborative exploratory instruction, as well as timing their questions and suggestions. This aligns with the bipolar perceive dimension (ACeCE) characteristic of freshman design majors, which is that they are more likely to independently construct theories and analytical techniques. The two icon creations that students completed before and after class enable them to fully understand the value of applying theory to practice. Most students are inspired by the classic style and apply it to the current icon design, though the degree and approach of application vary depending on each person's comprehension of the various points of knowledge. After the study, the majority of students demonstrate a noticeable improvement in the cohesiveness of the icon design, and some of them are even able to apply or even expand on the classic style. Lastly, the students' multiple prize wins at the NCDA Competition help to validate the effectiveness of the teaching method.

The Characteristics of Learning for Novices in Design

The innovative "style attraction + BTS teaching method" for teaching design history is beneficial for improving students' creativity, self-confidence, and intrinsic motivation, as evidenced by the comparison of pre- and post-study findings. Beginners can create in accordance with this visual layout if style guidance is reinforced in the teaching of design history and other theoretical training. The classic style does not always stifle creativity; rather, students' ability to learn and then borrow, incorporate, or expands their creative boundaries and fosters their imagination. Regarding intrinsic motivational efficacy, beginners typically lack design-related knowledge and lack confidence in their own designs. However, this teaching approach enables beginners to quickly grasp visual styles and the underlying

principles, providing a "quick fix" that boosts confidence in the design practice path and encourages beginners' intrinsic motivational efficacy toward design.

The association between creative self-confidence and intrinsic motivation efficacy was also investigated in this study. The findings indicated that intrinsic motivational efficacy was positively impacted by self-confidence in one's creative abilities, both before and after learning. This suggests that the "confidence" factor plays a pivotal role in igniting students' motivation to learn, and that the adage "confidence is the only thing that makes good grades possible" is no more meaningful than that. Due to this, this study makes use of a novel approach to teaching design history in order to boost students' creative self-confidence, which is essential for fostering intrinsic motivating effectiveness. Notably, after learning using the new teaching strategy, the students' standard deviation results on creativity and intrinsic motivation showed an expanding trend. This suggests that while the self-evaluation results were generally improved, the data were not uniformly distributed, and there were a few extremes or outliers, which suggested that different students absorbed the course content to varying degrees. Additionally, there was a widening of the differences in the effectiveness of creativity self-efficacy and intrinsic motivation, which could be related to the fact that each student's degree of self-efficacy was either raised significantly or not elevated. Simultaneously, the model connection demonstrating the differential explanatory power between pre- and post-learning on the impact of creative self-efficacy on intrinsic motivation efficacy was observed. While there was a positive relationship between creative self-efficacy and intrinsic motivational efficacy before and after learning, the explanatory power of the model was stronger and the standardized coefficient was higher after learning, indicating that creative self-efficacy had a greater impact on intrinsic motivational efficacy and that subjective evaluations performed better in terms of model validity after learning. Beginners found that the new design history teaching technique increased students' motivation for design practice by exacerbating the effect of their creative self-confidence on intrinsic motivational efficacy.

Conclusion

Using the BTS methodology as a guide, this study investigated a teaching model for a design history course and verified the effect of the teaching approach on design novices in terms of creative self-efficacy and intrinsic motivation. Beginners found the teaching approach to be effective, and their creative self-efficacy had a positive effect on intrinsic motivation. This phenomenon became more prominent after students experienced the new teaching strategy, indicating that the new teaching approach increased the impact of creative self-efficacy on intrinsic motivation. To have a more thorough grasp of the learning characteristics of starting design students, future study might examine the impact of exploratory learning on various student categories.

Funding

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A Cross-National Study of Mathematics Achievement via Three-Level Multilevel Models

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Abstract

The present study explored the effects of the national and cultural contexts on students' mathematics achievement. The study also investigated the nature and magnitude of student-level (level 1), school-level (level 2), and country-level (level 3) factors that are associated with math achievement. The Program for International Student Assessment (PISA) 2018 datasets were used. The findings of HLM analysis showed that mathematics achievement is associated with national and cultural contexts since the study found 31.30% of the total variation was accounted for level 3 in math achievement. Also, the study found that various predictors were statistically significant for explaining math achievement. Moreover, the study found several counterintuitive association phenomena due to the shift of meaning. These findings were explained regarding practical and theoretical implications for policymakers, educators, and researchers to improve students' mathematics achievement.

Keywords: Mathematics Achievement, Hierarchical Linear Modeling (HLM), Information and Communication Technology (ICT), Compositional Effects

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Introduction

The primary goal of the study is to explore the effects of the national and cultural contexts on students' mathematics achievement. Then, the nature and magnitude of country-level factors, as well as school- and student-level factors that are associated with math achievement was examined by using HLM analysis. Exploring country-level factors that contribute to the variation has been largely ignored in educational studies due to a lack of country-level data. Accordingly, studies investigating students' academic achievement heavily focus on the individual- and school-level factors. This study hypothesized that national and cultural characteristics are associated with math achievement. Also, the study hypothesized that there are several compositional factors strongly associated with math achievement as well. The specific research questions are presented in the following:

1. Is there significant variability in mathematics achievement across schools and countries? If so, how will total variation be allocated to student-, school-, and country-level?
2. How are country-level variables associated with the country-mean student's mathematics achievement?
3. Are there any school-level and country-level compositional factors strongly associated with mathematics achievement?

Theoretical Framework

The theoretical framework of this study is built on the multilevel paradigm. The development of multilevel analysis (Bryk & Raudenbush, 1992) and multilevel analysis software have promoted a multilevel paradigm in educational research. Since multilevel data should be explained by multilevel theories, researchers must define which direct effects and cross-level interaction effects can be expected in their studies by articulating specific theoretical models (Hox & Van, 2017). A cross-national study will be conducted in this study. Therefore, the study requires cross-level theorizing by identifying country-level characteristics that are associated with an individual- or group-level response (Tsui et al., 2007). Also, the hypothesis of the study is that country characteristics influence student achievement is underpinned by social cognitive theory (Bandura, 1986) and sociocultural theory (Vygotsky, 1978). Bandura's social cognitive theory stresses that learning occurs in social contexts with the interaction between personal factors and behavior (Bandura, 1986). Vygotsky's sociocultural theory emphasizes the influence of social interaction and culture in learning. Underpinned by both theories, this study hypothesized that mathematics achievement is influenced by not only individual characteristics but also environmental contexts.

Data

The data used in this study were obtained from the Programme for International Student Assessment (PISA) 2018, conducted by Organisation for Economic Cooperation and Development (OECD). Originally, PISA 2018 consisted of assessment of 612,004 students from 79 countries. In this study, 58 countries were selected for analysis. The number of students ranges from 3,209 to 34,925 and the number of schools ranges from 48 to 825. In this study, mathematics literacy results and variables from students' and schools' questionnaires in PISA2018 were used as student- and school-level. For country-level variables, data from various global reports and variables created by aggregating the school-level variables were used. As a dependent variable, the average 10 parameter estimates from the 10 plausible values (PVs) of mathematics proficiency was used.

Methodology

The analyses started with generating correlation matrixes between all variables in each level and the dependent variable. Then, hierarchical linear models (HLM) were implemented to explore the relationship between student-level, school-level, and country-level predictors and mathematics achievement. A three-level HLM was used as a primary analytic methodology in this study since the data has a nested structure, with students nested within schools, which in turn nested within countries. The HLM analysis of this study began with a fully unconditional model to determine whether the HLM is appropriate for the data. The fully unconditional model was formulated using mathematic achievement as an outcome variable with no level 1, level 2, or level 3 predictors. The HLM equations of the fully unconditional models are represented as follows:

Equation 1. *Equations for Unconditional Model*

Student-Level (Level 1) Model:
$$PVMATH_{ijk} = \pi_{0jk} + e_{ijk}$$

School-Level (Level 2) Model:
$$\pi_{0jk} = \beta_{00k} + \gamma_{0jk}$$

Country-Level (Level 3) Model:
$$\beta_{00k} = \gamma_{000} + u_{00k}$$

After running the unconditional model, the conditional model was built by adding all student-level, school-level, and country-level predictors. All the predictors in the country-level (level 3) were centered at grand-mean. Centering around grand mean at level 3 allows us to improve the interpretation of the intercept values. All the student-level (level 1) and school-level (level 3) variables were group-mean centered. When group-mean centering of the student-level predictors is used, the student-level predictor coefficients (γ_{k00}) represent within-school effects and the school-level predictor coefficients (γ_{0k0}) represent within-country effects.

Equation 2. *Equations for Conditional Model*

Student-Level (Level 1) Model:
$$PVMATH_{ijk} = \pi_{0jk} + \pi_{1jk}\,(FEM_{ijk}) + \pi_{2jk}\,(PARED_{ijk}) + \pi_{3jk}\,(ICT_{ijk}) + \pi_{4jk}\,(PARES_{ijk}) + \pi_{5jk}\,(BELN_{ijk}) + \pi_{6jk}\,(RSELF_{ijk}) + \pi_{7jk}\,(MAG_{ijk}) + \pi_{8jk}\,(FFAIL_{ijk}) + \pi_{9jk}\,(OA_{ijk}) + \pi_{10jk}\,(VSCH_{ijk}) + \pi_{11jk}\,(GM_{ijk}) + e_{ijk}$$

School-Level (Level 2) Model:
$$\pi_{0jk} = \beta_{00k} + \beta_{01k}\,(RURAL_{jk}) + \beta_{02k}\,(CITY_{jk}) + \beta_{03k}\,(PRIV_{jk}) + \beta_{04k}\,(STR_{jk}) + \beta_{05k}\,(PFT_{jk}) + \beta_{06k}\,(CSIZE_{jk}) + \beta_{07k}\,(CREA_{jk}) + \beta_{08k}\,(SBHL_{jk}) + \beta_{09k}\,(TBHL_{jk}) + \beta_{010k}\,(XFEM_{jk}) + \beta_{011k}\,(XPARED_{jk}) + \beta_{012k}\,(XICT_{jk}) + \beta_{013k}\,(XPARES_{jk}) + \beta_{014k}\,(XBELN_{jk}) + \beta_{015k}\,(XRSELF_{jk}) + \beta_{016k}\,(XMAG_{jk}) + \beta_{017k}\,(XFFAIL_{jk}) + \beta_{018k}\,(XOA_{jk}) + \beta_{019k}\,(XVSCH_{jk}) + \beta_{020k}\,(XGM_{jk}) + \gamma_{0jk}$$
$$\pi_{1jk} = \beta_{10k}$$
$$\pi_{2jk} = \beta_{20k}$$
$$\pi_{3jk} = \beta_{30k}$$

$$\pi_{4jk} = \beta_{40k}$$
$$\pi_{5jk} = \beta_{50k}$$
$$\pi_{6jk} = \beta_{60k}$$
$$\pi_{7jk} = \beta_{70k}$$
$$\pi_{8jk} = \beta_{80k}$$
$$\pi_{9jk} = \beta_{90k}$$
$$\pi_{10jk} = \beta_{100k}$$
$$\pi_{11jk} = \beta_{110k}$$

Conclusions

All results for the model can be found in the Table 5. In the fully unconditional model, the average mathematics achievement score (the intercept at level 1) is estimated to be 417.49. The estimated variance components from the model were $\sigma^2 = 4506.93$, $\tau_\pi = 2916.65$, and $\tau_\beta = 3382.67$ at the student, school, and country level (Table 6.). this model found that 41.71% of the variation in mathematics achievement was due to difference among students, and 26.99% of the total variance in math achievement was attributable to differences among schools. Lastly, 31.30% of the variance in math achievement was accounted for by difference among countries. Since the school variance component and country variance component are both significant and the variability in math achievement at the school- and country-level were large, conducting a HLM is necessary to be processed.

In the conditional model (See Table 5), the strict university admission system, the country-mean city, country-mean proportion of fully certified teacher, country-mean teacher behavior hindering learning, and country-mean ICT usage were positively associated with math achievement while country-mean student-teacher ratio, country-mean parental education level, and country-mean resilience self-efficacy were negatively associated with math achievement. One of interesting findings from the final model was that the partial correlation between country-mean resilience self-efficacy and country-mean students' math achievement became negative after controlling for other predictors in the model which was opposite of the results of the correlation matrix among the student-level predictors with the dependent variable. Figure 1 shows the scatterplot show the marginal correlation between student's resilience self-efficacy and math achievement with regression lines based on 58 countries. As shown in the Figures, student's resilience self-efficacy and math achievement had a positive relationship. This indicates that students who believe more strongly in their ability to cope with difficult or challenging experience show higher math achievement. From results of the conditional model, several compositional effects were detected for school- and country-level. Firstly, there was only one factor that compositional effects were detected from both school- and country-level, which was ICT usage. Meanwhile, the following three variables that were showed school compositional effects on math achievement: parents' emotional support, occupational aspiration, and growth mindset.

On the other hand, Figure 2 shows the scatterplot of country-mean resilience self-efficacy against country-mean math achievement. This figure does not indicate students with lower resilience self-efficacy show higher math achievement. Instead, shift of meaning plays a role in the macro-level relationship. The meaning of resilience self-efficacy variable that is aggregated to the country-level distinct from the meaning of student-level resilience self-efficacy. The occurrence of counterintuitive association might be due to shift of meaning. If we make inferences about student's resilience self-efficacy based on country-mean resilience

self-efficacy, an ecological fallacy may occur by ignoring the disparity between the country-level and student-level. The country-mean resilience self-efficacy refers to the cultural context of country. In the other word, the country-mean resilience self-efficacy means beliefs and values that are shared among people in a country. As shown in the Figure, East Asian countries generally show low country-mean resilience self-efficacy while those countries show high country-mean math achievement. This may represent cultural characteristics of those countries.

Second finding of this study was that the country-mean parental education level had a negative association with country-mean students' math achievement. This result was opposite to majority of previous literature that parents' education is positively associated with their children's academic outcomes. The study found that the coefficient for country-mean parental education level went from positive to negative when the country-mean ICT usage was added as the sole predictor. Scatterplots describing the relationship between country-mean parental education and country-mean math achievement were created to understand the results of the model. As shown in Figure 3, a group of countries have high level of country-mean ICT usage (larger than 50th percentile) showed a negative relationship between country-mean parental education and country-mean math achievement while a group of countries have low level of country-mean ICT usage (smaller than 50th percentile) showed a positive relationship between country-mean parental education and country-mean math achievement. This situation in which a relationship observed at the group reverse is known as Simpson's paradox (Blyth, 1972). The results of the model found that country-mean ICT usage plays a role as a confounding variable which reversed the association between country-mean parental education and country-mean math achievement.

Also, the final model found that country-mean teacher behavior hindering learning which represents school climate in school-level predictors had positive association with students' math achievement after controlling for other predictors in the model. As shown in school-level correlation matrix from Table 3, there was a negative correlation between the school-level teacher behavior hindering learning variable and school-mean students' math achievement. Figure 4 shows the scatterplot displaying the relationship teacher behavior hindering learning variable and school-mean students' math achievement. Such counterintuitive association phenomena may be due to shift of meaning. It shows that meaning of a micro-level variable aggregated to the macro-level is distinct from the micro-level variable. The average of the school-level variables may be used as an index for countries' cultural climate; hence higher scores of the country-mean teacher behavior hindering learning from countries may represent greater level of standard for school climate. In other words, country-mean teacher behavior hindering learning may represent the level of standard for teacher in countries. Figure 5 shows the scatter plot regarding relationship between country-mean teacher behavior hindering learning and country-mean math achievement. As shown in the scatter plot, East Asian countries including China, Chinese Taipei, Hong Kong, Singapore, Japan, and Korea generally higher than other countries. This may indicate that East Asian countries have higher standard for teacher behaviors.

The findings of the study provide important practical and theoretical implications for policy makers, educator, and researchers. First, the findings supported the hypothesis of this study that mathematics achievement was associated with national and cultural contexts because the study found 31.30% of the total variation was accounted for country level in math achievement. This result provided a justification that country characteristics should be examined in a context of cross-national comparison study.

One of the unique findings of the present study was that the shift of meaning played important roles in interpreting the country-mean teacher behavior hindering learning in the conditional model. The meanings of the variable were apparently distinct from the meanings as school-level variable. The country-mean teacher behavior hindering learning can be used as index for 'national standard for teacher'.

Also, the study found that the country-mean ICT usage played a role as a confounding variable which reversed the sign of the correlation between the country-mean parental education level and country-mean math achievement. The finding indicates that the school-mean ICT usage and country-mean ICT usage promote student's math achievement even after controlling for student-level predictors. This finding provided strong evidence in supporting previous research that ICT plays an important role in student's academic achievement. Accordingly, the finding provided practical implication for educators and policy makers that supporting ICT resources and providing good learning environment through ICT to students would facilitate student's mathematics achievement.

Appendices

	Name	Description	Valid N	Distribution			
				Min	Max	Mean	SD
Y	PVM1	Plausible Value 1 in Mathematics	455,206	24.74	864.60	456.67	105.28
	PVM2	Plausible Value 2 in Mathematics	455,206	25.56	892.73	456.59	105.39
	PVM3	Plausible Value 3 in Mathematics	455,206	53.19	910.44	456.57	105.38
	PVM4	Plausible Value 4 in Mathematics	455,206	29.97	870.64	456.67	105.52
	PVM5	Plausible Value 5 in Mathematics	455,206	8.27	915.10	456.39	105.60
	PVM6	Plausible Value 6 in Mathematics	455,206	5.22	870.20	456.48	105.41
	PVM7	Plausible Value 7 in Mathematics	455,206	3.21	883.59	456.81	105.59
	PVM8	Plausible Value 8 in Mathematics	455,206	0.00	889.80	456.65	105.39
	PVM9	Plausible Value 9 in Mathematics	455,206	26.58	899.89	456.45	105.43
	PVM10	Plausible Value 10 in Mathematics	455,206	24.92	894.59	456.59	105.57
X_1	FEM	Student Gender	455,206	0.00	1.00	0.50	0.50
	PARED	Highest parental education in years of Schooling	455,206	3.00	18.00	13.52	3.10
	ICT	ICT resources	455,206	-4.01	4.01	-0.45	1.16
	PARES	Parents' emotional support perceived by student	455,206	-2.45	1.03	-0.05	0.94
	BELN	Sense of belonging to school	455,206	-3.32	3.23	-0.07	0.94
	RSELF	Resilience	455,206	-3.17	2.77	0.07	0.99
	MAG	Mastery goal orientation	455,206	-2.53	1.85	0.14	1.01
	FFAIL	General fear of failure	455,206	-1.89	1.89	-0.03	0.95
	OA	Expected occupational status	455,206	-3.12	1.27	-0.01	1.00
	VSCH	Attitudes towards learning activities	455,206	-2.54	1.08	0.03	0.98
	GM	Growth mindset	455,206	-1.75	1.54	0.00	1.00
X_2	XFEM	Proportion of females in school	13,519	0.00	1.00	0.49	0.22
	XPARED	Mean of student level parental education level	13,519	3.00	18.00	13.42	1.79
	XICT	Mean of student level ICT usage	13,519	-3.96	2.10	-0.51	0.81
	XPARES	Mean of student level perceived parents 'emotional support	13,519	-2.45	1.03	-0.07	0.39
	XBELN	Mean of student level sense of belonging in school	13,519	-3.24	3.22	-0.09	0.38
	XRSELF	Mean of student level resilience self-efficacy	13,519	-3.17	2.70	0.04	0.39
	XMAG	Mean of student level mastery goal orientation	13,519	-2.53	1.85	0.13	0.46
	XFFAIL	Mean of student level fear of failure	13,519	-1.89	1.89	-0.04	0.36
	XOA	Mean of student level occupational aspiration	13,519	-3.09	1.25	-0.07	0.60
	XVSCH	Mean of student level belief in the value of school	13,519	-2.54	1.08	0.01	0.34
	XGM	Mean of student growth mindset	13,519	-1.75	1.54	-0.00	0.39
	RURAL	Location of the school (Rural=1, Town =0)	13,519	0.00	1.00	0.34	0.47
	CITY	Location of the school (City=1, Town=0)	13,519	0.00	1.00	0.39	0.49
	PRIV	Type of school (Public=0, Private=1)	13,519	0.00	1.00	0.20	0.40
	STR	Student-teacher ratio	13,519	0.01	0.90	0.14	0.83
	PFCT	Proportion of fully certified teachers	13,519	0.00	1.00	0.80	0.34
	CSIZE	The number of students in one classroom	13,519	13.00	53.00	27.72	10.45
	EXTRA	The number of extra-curricular activities at school	13,519	0.00	3.00	1.85	1.03
	SBHL	student-related factors affecting school climate	13,519	-4.35	3.63	0.01	1.26
	TBHL	teacher-related factors affecting school climate	13,519	-2.09	3.83	0.12	1.16
X_3	YFEM	Proportion of females in the country	13,519	0.46	0.54	0.50	0.02
	YPARED	Mean of the school level parental education level	58	10.89	16.63	13.49	1.18
	YICT	Mean of school level access to ICT resources usage	58	-1.93	0.59	-0.51	0.63
	YPARES	Mean of school level perceived parents' emotional support	58	-0.46	0.32	-0.06	0.16
	YBELN	Mean of school level school engagement	58	-0.40	0.46	-0.10	0.19
	YRSELF	Mean of school level resilience self-efficacy	58	-0.61	0.60	0.06	0.22
	YMAG	Mean of school level mastery goal orientation	58	-0.34	0.67	0.14	0.28
	YFFAIL	Mean of school level fear of failure	58	-0.42	0.67	-0.04	0.23
	YOA	Mean of school level student occupational aspirations	58	-0.54	0.47	-0.04	0.48
	YVSCH	Mean of school level belief in the value of school	58	-0.46	0.51	0.01	0.21
	YGM	Mean of school level growth mindset	58	-0.64	0.43	-0.01	0.20
	YRURAL	Proportion of rural in the country	58	0.00	0.71	0.34	0.17
	YCITY	Proportion of city in the country	58	0.00	1.00	0.39	0.19
	YPRIV	Mean of school level type of school	58	0.00	0.90	0.18	0.20
	YSTR	Mean of school level student-teacher ratio	58	0.07	0.25	0.13	0.45
	YPFCT	Mean of school level proportion of fully certified teacher	58	0.29	0.97	0.79	0.17
	YCSIZE	Mean of school level class size	58	16.75	38.93	25.10	5.07
	YEXTRA	Mean of school level extra-curricular activities in school	58	-1.24	1.09	0.02	0.44
	YSBHL	Mean of school level student behavior hindering learning	58	-1.53	0.90	-0.07	0.47
	YTBHL	Mean of school level teacher behavior hindering learning	58	1.02	2.82	1.81	0.45
	OECD	Member of OECD (OECD=1, No OECD=0)	58	0.00	1.00	0.41	0.50
	STRICT	Types of admission procedure in higher education (Strict system=1, Flexible system=0)	58	0.00	1.00	0.90	0.31
	GDP	GDP per capita in 2018 (in U.S dollar) Divided into 10,000	58	0.32	8.64	2.42	2.10
	GG	Global Gender Gap Report from World Economic Forum (as %)	58	0.58	0.88	0.71	0.05
	GINI	GINI index measured the degree of inequality in the distribution of family income in a country (as %). Revers coded.	58	0.46	0.76	0.64	0.07

Table 1. Summary of variables in the final sample

	XFEM	XPARED	XICT	XPARES	XBELN	XRSELF	XMAG	XFFAIL	XOA	XVSCH	XGM	STR	PFCT	CSIZE	EXTRA	SBHL	TBHL	RURAL	CITY	PRIV	XPM1–XPM10
XFEM	1																				
XPARED	.015	1																			
XICT	.035**	.623**	1																		
XPARES	.184**	.176**	.223**	1																	
XBELN	.103**	.170**	.186**	.424**	1																
XRSELF	.060**	.007	.011	.419**	.375**	1															
XMAG	.122**	-.113**	-.254**	.302**	.117**	.480**	1														
XFFAIL	.113**	.059**	.145**	.035**	-.159**	-.123**	-.040**	1													
XOA	0	-.089**	-.101**	.038**	-.004**	.121**	.178**	-.008**	1												
XVSCH	.147**	-.028**	.012	.359**	.314**	.263**	.373**	.032**	.269**	1											
XGM	.067**	.258**	.378**	.137**	.163**	-.050**	-.142**	-.015	.118**	.078**	1										
STR	.043**	-.134**	-.232**	-.005	-.080**	.046**	-.159**	.061**	.152**	.116**	-.017*	1									
PFT	-.014	.028*	.075**	.031*	-.033**	-.134**	.154**	.038**	-.085**	-.045**	.068**	-.065**	1								
CSIZE	.086**	-.101**	-.146**	.154**	-.016	.084**	.119**	.111**	.223**	.110**	-.043**	.366**	-.001	1							
EXTRA	.097**	.107**	.155**	-.139**	-.129**	.047*	.042**	.153**	.122**	.049**	.103**	.021	.058**	.097**	1						
SBHL	-.066**	-.150**	-.112**	-.034**	-.060**	-.069**	-.065**	-.077**	-.165**	-.081**	-.025*	.064**	.052**	.075**	-.103**	1					
TBHL	-.012	-.050**	-.026*	-.069**	-.042**	-.032*	.005	-.016	.008	.017	.037**	.041**	.012	.040**	-.039**	.640**	1				
XRURAL	-.030*	-.243**	-.255**	.075**	.031*	-.035*	.074**	-.137**	-.165**	-.037**	-.184**	-.146**	-.01	-.237**	-.120**	-.01	-.044**	1			
XCITY	.021	.215**	.210**	.075**	.031*	.048**	.01	.142**	.197**	.033*	.161**	.110**	-.021*	.204**	.124**	-.029*	.042**	-.577**	1		
XPRIV	.010	.242**	.257**	.150**	.124**	.089**	.022	.128**	.174**	.127**	.087**	.056**	-.172**	.019*	.064**	-.212**	-.084**	-.189**	.209**	1	
XPM1	.085**	.464**	.609**	.262**	.252**	-.046**	-.215**	.205**	.182**	.002	.388**	-.179**	.160**	-.036*	.242**	-.202**	-.046**	-.229**	.205**	.157**	1
XPM2	.083**	.464**	.606**	.263**	.255**	-.044**	-.209**	.203**	.185**	.003	.390**	-.180**	.161**	-.037*	.240**	-.202**	-.044**	-.229**	.205**	.160**	1
XPM3	.082**	.462**	.608**	.263**	.252**	-.043**	-.214**	.206**	.185**	.003	.386**	-.177**	.162**	-.036*	.241**	-.203**	-.048**	-.233**	.206**	.160**	1
XPM4	.082**	.460**	.606**	.262**	.251**	-.048**	-.215**	.208**	.178**	.004	.388**	-.178**	.161**	-.035*	.241**	-.203**	-.045**	-.231**	.206**	.160**	1
XPM5	.080**	.461**	.608**	.264**	.255**	-.041**	-.210**	.204**	.181**	.003	.385**	-.180**	.160**	-.038*	.240**	-.204**	-.047**	-.229**	.206**	.162**	1
XPM6	.084**	.460**	.606**	.261**	.253**	-.046**	-.213**	.205**	.183**	.003	.388**	-.177**	.163**	-.035*	.241**	-.203**	-.046**	-.233**	.207**	.158**	1
XPM7	.084**	.459**	.605**	.262**	.252**	-.045**	-.215**	.206**	.179**	.002	.390**	-.179**	.163**	-.038*	.240**	-.201**	-.046**	-.230**	.205**	.160**	1
XPM8	.083**	.459**	.605**	.262**	.255**	-.043**	-.213**	.205**	.184**	.002	.385**	-.178**	.161**	-.035*	.241**	-.204**	-.048**	-.230**	.207**	.159**	1
XPM9	.082**	.462**	.605**	.261**	.253**	-.045**	-.212**	.205**	.183**	.001	.388**	-.178**	.164**	-.035*	.242**	-.202**	-.046**	-.229**	.206**	.156**	1
XPM10	.079**	.462**	.605**	.263**	.255**	-.044**	-.216**	.200**	.181**	.004	.387**	-.179**	.162**	-.034*	.241**	-.201**	-.044**	-.230**	.206**	.158**	1

Table 2. School Level (Level-2) Correlation Matrix (J = 13,519)

Table 3. Country Level (Level-3) Correlation Matrix (K = 58)

Correlation matrix with variables: YFEM, YPARED, YICT, YPARES, S, YBELN, YRSELF, YMAG, YFFAIL, YOA, YVSCH, YGM, YRURAL, YCITY, YSTR, YPRIV, YPPCT, YCSIZE, YEXTRA, YSBHL, YTBHL, OECD, STRICT, GDP, GG, GINI, YPV1–YPV10.

** . Correlation is significant at the 0.01 level (2-tailed)

* . Correlation is significant at the 0.05 level (2-tailed)

	Fully unconditional model	Conditional model
Fixed Effects		
Intercept, γ_{000}	417.49***	450.11***
OECD, γ_{001}		18.02
STRICT, γ_{002}		25.89*
GDP, γ_{003}		1.01
GG, γ_{004}		153.97
GINI, γ_{005}		68.30
Country-mean Rural, γ_{006}		92.12
Country-mean City, γ_{007}		94.02*
Country-mean Private School, γ_{008}		33.15
Country-mean Student-Teacher Ratio, γ_{009}		-366.06**
Country-mean Proportion of Fully Certified Teachers, γ_{0010}		56.67*
Country-mean Class Size, γ_{0011}		-0.20
Country-mean Extra-Curricular Activities in School, γ_{0012}		-13.93
Country-mean Student Behavior Hindering Learning, $\gamma0_{013}$		24.42
Country-mean Teacher Behavior Hindering Learning, γ_{0014}		36.61***
Country-mean Female, γ_{0015}		-263.69
Country-mean Parental Education Level, γ_{0016}		-14.45**
Country-mean ICT usage, γ_{0017}		35.44**
Country-mean Parents Emotional Support, γ_{0018}		5.35
Country-mean Sense of Belonging, γ_{0019}		48.37
Country-mean Resilience Self-efficacy, γ_{0020}		-105.90**
Country-mean Mastery Goal Orientation, γ_{0021}		24.23
Country-mean Fear of Failure, γ_{0022}		6.18
Country-mean Occupational Aspiration, γ_{0023}		31.44
Country-mean Belief in the value of school, γ_{0024}		-47.18
Country-mean Growth Mindset, γ_{0025}		26.37
Rural, γ_{010}		-6.92*
City, γ_{020}		5.30
Private School, γ_{030}		2.83
Student-Teacher Ratio, γ_{040}		10.59
Proportion of Fully Certified Teachers, γ_{050}		0.63
Class Size, γ_{060}		0.20
Extra-Curricular Activities in School, γ_{070}		4.27**
Student Behavior Hindering Learning, γ_{080}		-6.65***
Teacher Behavior Hindering Learning, γ_{090}		2.43
School-mean Female, γ_{0100}		2.84
School-mean Parental Education Level, γ_{0110}		0.22
School-mean ICT Usage, γ_{0120}		23.55***
School-mean Parents' Emotional Support, γ_{0130}		18.43***
School-mean Sense of Belonging in School, γ_{0140}		12.92**
School-mean Resilience Self-efficacy, γ_{0150}		-4.03
School-mean Mastery Goal Orientation, γ_{0160}		1.81
School-mean Fear of Failure, γ_{0170}		7.90
School-mean Occupational Aspiration, γ_{0180}		24.11***
School-mean Belief in the value of school, γ_{0190}		9.19
School-mean Growth Mindset, γ_{0200}		23.37***
Female, γ_{100}		-8.69**
Parental Education Level, γ_{200}		-0.12
ICT Usage, γ_{300}		5.49***
Parents' Emotional Support, γ_{400}		3.86***
Sense of Belonging in School, γ_{500}		1.26
Resilience Self-efficacy, γ_{600}		2.45**
Mastery Goal Orientation, γ_{700}		1.32
Fear of Failure, γ_{800}		1.86
Occupational Aspiration, γ_{900}		8.81***
Belief in the value of school, γ_{1000}		1.23
Growth Mindset, γ_{1100}		8.15***

Table 4. Results of HLM Analysis

*Note. *$p \leq 0.05$; **$p \leq 0.01$; ***$p \leq 0.001$*

Model	Country-level Variance		School-level Variance		Student-level Variance	
	Intercept Variance	R^2	Intercept Variance	R^2	Intercept Variance	R^2
Fully unconditional	3382.67***	(Base)	2916.65***	(Base)	4506.93***	(Base)
Conditional	233.93	0.9308	1449.47	0.5030	4315.68	0.0444

Table 5. Proportion of Variance Explained
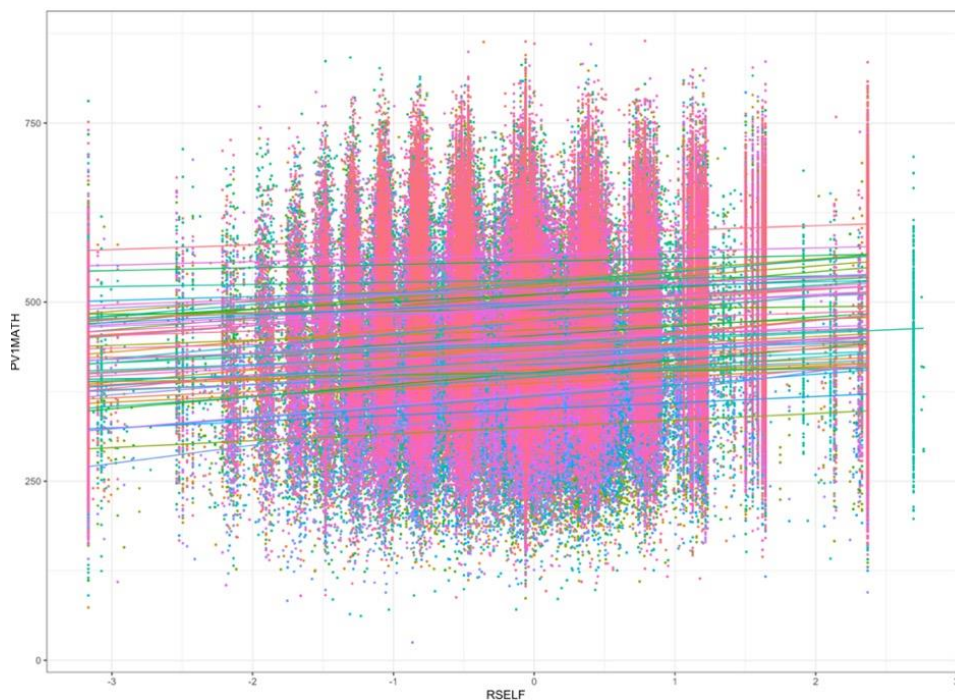
Figure 1. Scatterplot-relationship between resilience self-efficacy (RSEFL) and math achievement (PVMATH)
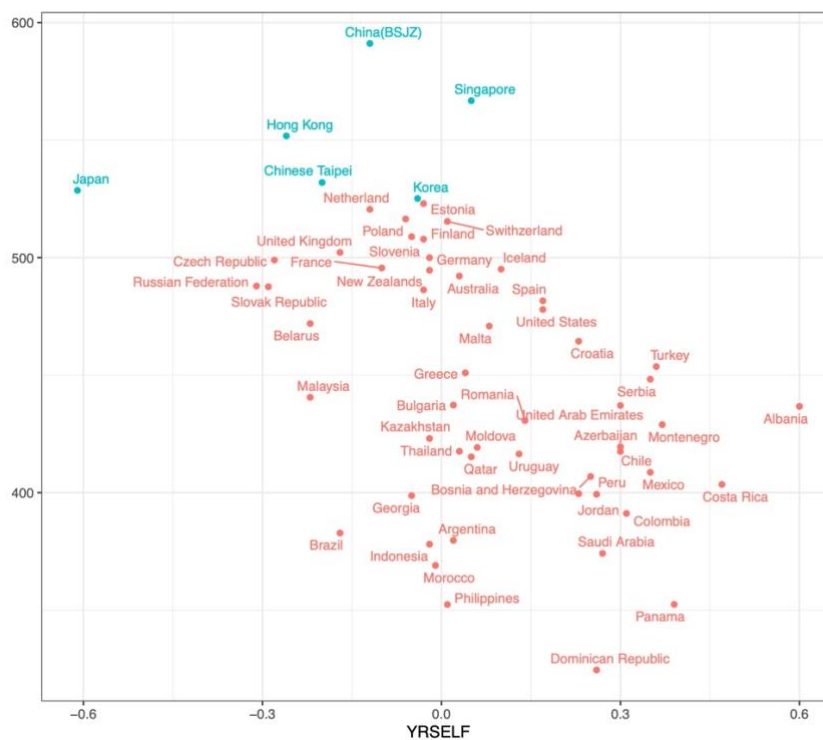
Figure 2. Scatterplot-relationship between country-mean resilience self-efficacy (YRSELF) and country-mean math achievement (YPV1MATH) by grouping East Asian Countries and Not East Asian Countries
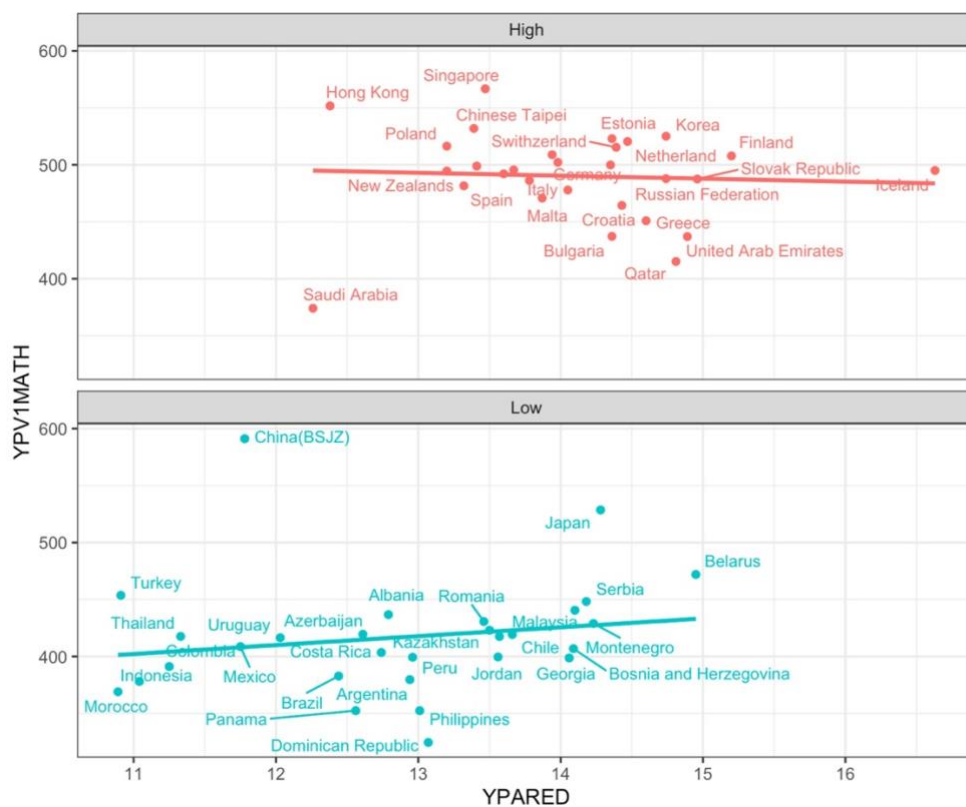
Figure 3. Scatterplot-relationship between country-mean parental education level (YPARED) and country-mean math achievement (YPV1MATH) by grouping ICT usage
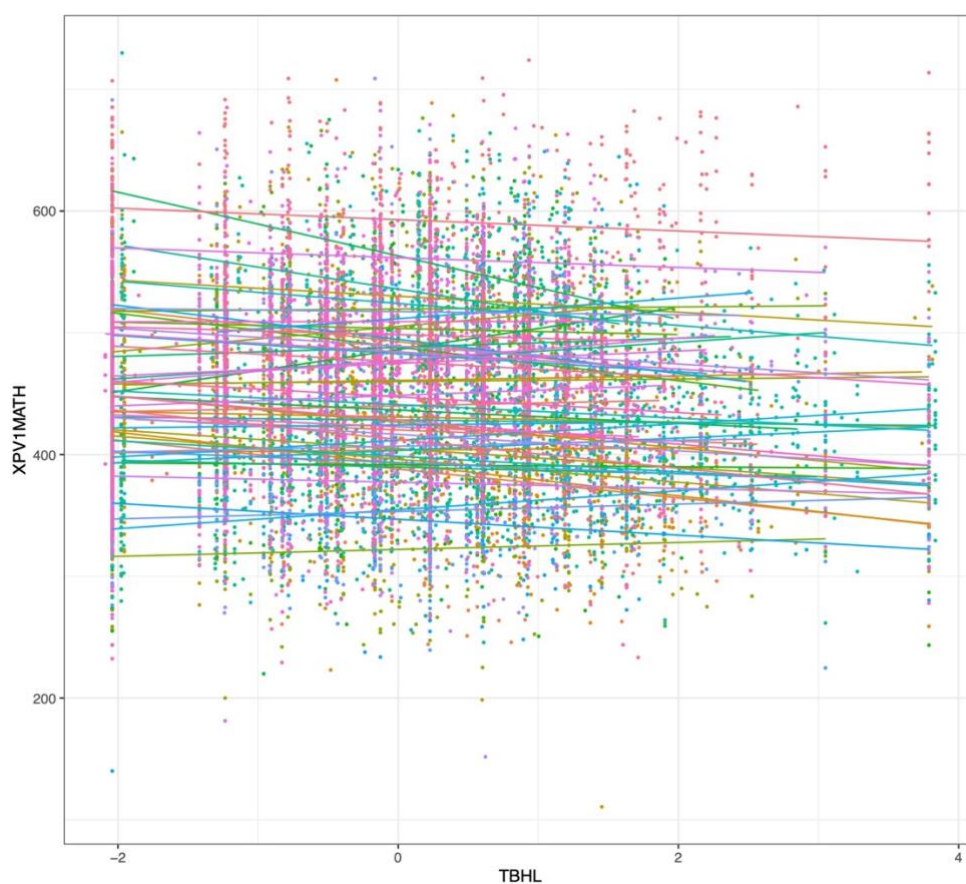
Figure 4. Scatterplot-relationship between school-mean teacher behavior hindering learning (TBHL) and school-mean math achievement (XPV1MATH) by grouping 58 countries
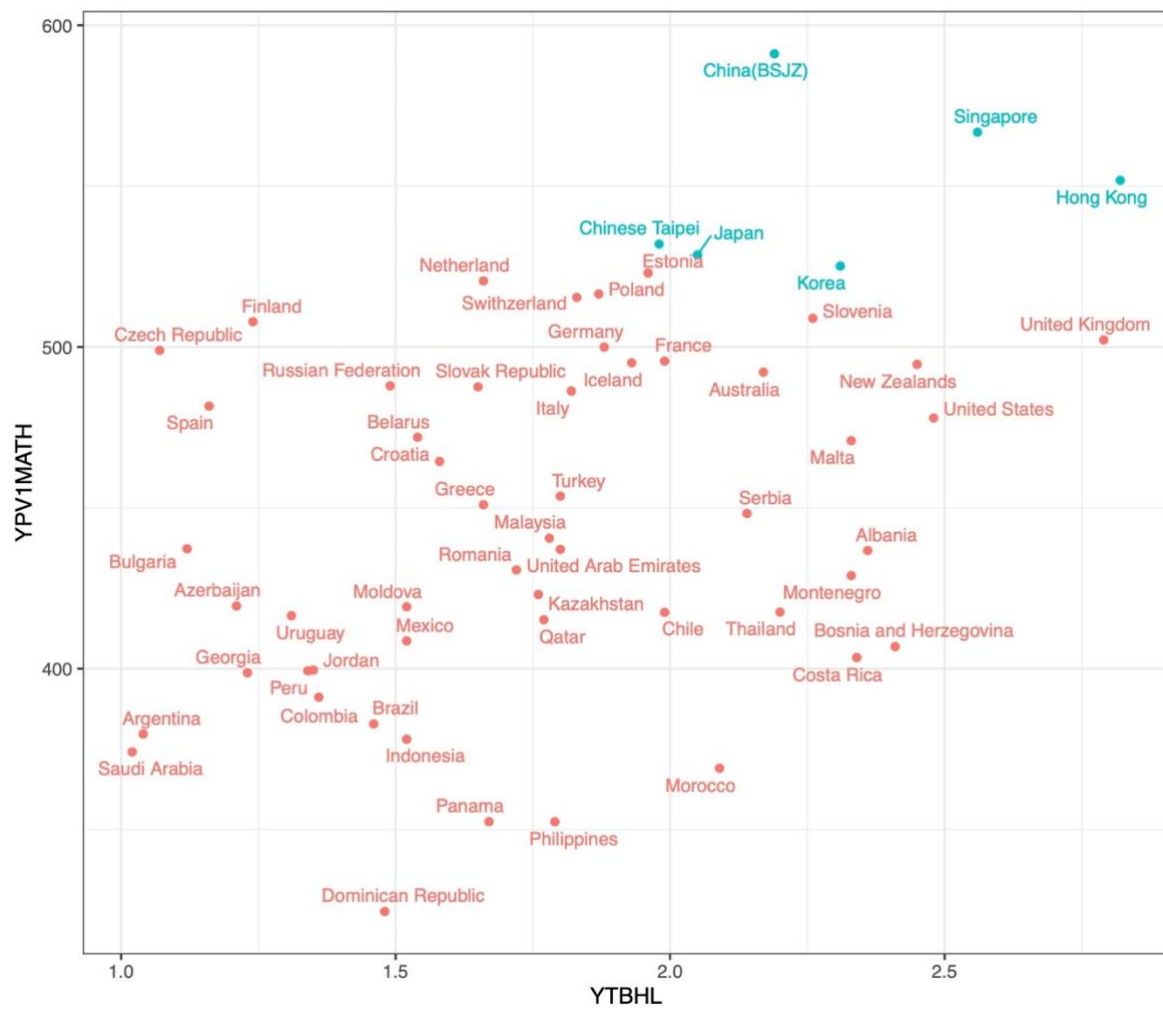
Figure 5. Scatterplot-relationship between country-mean teacher behavior hindering learning (YTBHL) and country-mean math achievement (YPV1MATH) by grouping East Asian Countries and Not East Asian Countries

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Development and Implementation of Science Boost Camp:
Impact on Student's Science Conceptual Understanding and Motivation to Learn Science

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Abstract

After COVID-19, the teachers in Brunei have been busy trying to catch up on the learning loss faced during the pandemic, especially the Year 11 science students who will be sitting for their Cambridge's 'O' Level examination this year as the first cohort of the new 5129 Combined Science syllabus. Switching back from online learning during COVID19 to face-to-face learning in school has been a great challenge for the teachers. In this paper, the researcher is trying to understand what motivates these students to learn Science and to adapt back to face-to-face teaching and learning. This study employed mixed method research (MMR) to understand the assumed causes of low achievement in the qualifying examination of the Year 11 science students. This study also sought to understand how the science boost camp could be adopted to improve students' achievement in the 'O' level examination and how the camp could be evaluated for their effectiveness. The initial analysis shows that the Science Boost camp was able to increase students' motivation and understanding of science concepts, the advantages of group work and active learning. In addition, the effectiveness of the boost camp was discussed and evaluated for the next boost camp as part of students' intensive examination preparation for their upcoming 'O' level examination. This study summarized the essential attributes of a Science Boost Camp weekly course as the future development as one of the strategies for examination preparation.

Keywords: Science Achievement, Science Motivation, Mixed Method Research (MMR), Science Boost Camps, Science Conceptual Understanding

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Introduction

Background of the Study

This study reported in the design of a mixed method study aims to evaluate the effectiveness of a revision strategy called Get Your Credit (GYC) Science Boost Camp for GCE O level preparation with cooperative learning. The purpose of this study is twofold: i) to assess the impact of boost camp designed activities for Bruneian secondary students learning combined science and ii) to examine the process of students' motivation in learning science. The boost camp designed activities are designed using Technological, Pedagogical and Content Knowledge (TPACK) framework and known as Technological Enriched Learning Activities (TELA) in this research.

Hands on activities can be used to help students to visualize the correct concepts that are so challenging for them, due to the abstract nature of scientific knowledge (Dhindsa & Treagust, 2009). The importance of understanding 'overloaded' abstract concepts of science has been emphasized by many researchers (Dhindsa & Treagust, 2009; Simon, 1975; Garegae, 2009). Similarly, Good and Berger (2005) noted that understanding scientific representations of our physical world is essential for the achievement of higher levels of scientific literacy. However, achieving higher levels of scientific literacy and helping students to understand abstract science concepts requires those learners to visualize the correct concepts to avoid misconceptions. Hence, teacher's lessons preparation is very crucial to implant the correct scientific concepts in students.

The importance of integrating a teacher's competence in pedagogy and content was initially emphasized and visualized in Schulman's (1986) Pedagogical Content Knowledge model (PCK) and this PCK model was further developed by Mishra and Koehler (2009) into what is known as the Technological, Pedagogical and Content Knowledge (TPACK) model. TPACK is a knowledge-based teaching method that teachers need for effective technology integration. (Kurt et al., 2014).

Literature Review

To test teachers' knowledge base for designing lessons using a TPACK framework, Harris and Hofer (2009) developed taxonomies of learning activities (pedagogy) for specific subject matter domains. They then related those taxonomies to possible uses of technology to support the instructional planning of teachers. Learning activities could then be used as a planning tool to develop and describe plans for technology-enhanced learning. To achieve this goal, teachers need to understand the most powerful ways of embedding technology-based experiences in science teaching and learning (McFarlane & Sakellariou, 2002).

Therefore, further research and more concerted efforts among policy makers, science education researchers, and science teachers are needed (Symington & Tytler, 2004). Similarly, Duit and Treagust (1998) pointed out that research investigating students' conceptual progress is limited. In the same paper the authors also noted that there is no study that has investigated how / if students' conceptions change after instructions. As there is no study that has specifically investigated how students develop conceptual understanding in science, this study will adopt and refer to the literature that reports investigations into conceptual understanding in science. Even in Brunei Darussalam, the current priority of the

Ministry of Education is to prepare the teachers to teach students the new skills needed to overcome the challenges of the new era (Othman, 2019).

In recent years, the number of students learning science in Brunei has diminished as can be seen in the Cambridge General Certification Ordinary Level (GCE O Level) examination results. Upper secondary science involves a three-year upper secondary science syllabus from the Cambridge General (GCE) Ordinary Level, taught in English language. The examination is sat by students from all over Asia, such as Bangladesh, Mauritius, Sri Lanka, Singapore, Malaysia and Brunei Darussalam, in order to prepare candidates for advanced study either locally or internationally. The low-level performance has also been reported for other countries which take combined science in the GCE O Level examinations as shown in Table 1 below. The cumulative world total grades for combined science over the past ten years are presented in the following Table 1.

Year	Percentage of students obtaining grade C and above *(Grade C or above = Credit and Distinction)*
2022	24.4
2021	*Not applicable* 38.3 *COVID-19 School Assessment Grade*
2020	27.2
2019	20.3
J2019	23.9
N2018	20.0
J2018	30.0
N2017	21.0
N2016	62.0
N2015	21.0
N2014	24.0
N2013	24.0
N2012	22.0
N2011	21.0
N2010	22.0
N2009	24.0
N2008	24.0
N2007	30.0

Table 1: GCE O Level world grades for Combined Science subjects from 2007 to 2022
(https://www.cambridgeinternational.org/programmes-and-qualifications/cambridge-upper-secondary/cambridge-o-level/results-statistics/)

The current problem faced by schools in Brunei and some other parts of the world is the failing grades of combined science in the General Certificate Examination (GCE) O Level. This is shown in the cumulative world total grades for combined science in the Cambridge Assessment International Education (CAIE) over the past ten years; from 2007 to 2022. The grades are constantly below 30% of the passing marks of 50% (*see Table 1*). A grade below 30% is ungraded, meaning students do not get an 'O' Level after being exposed to the subjects for three years in their upper secondary school years. Low achievement is the situation where a child fails to acquire basic skills while: a) they do not have any identified disability and b) have cognitive skills within the normal range. In those cases, low

achievement may be considered as a failure of the education system to teach well, as much as the student to learn well (Report by Thematic Working Group on Mathematics, Science and Technology, 2010 – 2013).

The cumulative grades of below 30% for upper secondary science (combined science) has shown that students seem to learn by rote rather than cognitive understanding of the taught subjects. Researchers who advocate teaching and learning science by understanding, are trying to find ways to determine in detail what is involved in a person's mind when he learns and understands something (Dhindsa & Treagust 2009; Simon, 1975). Furthermore, the students' understanding of the concepts learnt is a sign of achievement to the teachers while to the student it means a furtherance of his / her education, hence a brighter future (Garegae, 2009). Hence the importance of understanding science concepts has led to the teachers trying to develop techniques for transforming rote learning into meaningful learning (Simon, 1975). Schools in Brunei use a science syllabus like that used in Britain (Sharifah, 1999). Science instruction is in English, which is very difficult for most students, as English is their second/third language.

Objective of Research

Reports compiled by the Ministry of Education; Brunei (2015) shows that a very low exam achievement in the Cambridge General Certificate of Education (CGC E 'O ' level) in combined science was due to the failure of students to acquire a basic conceptual understanding of the topic (Report by Brunei's Ministry of Education, Education Data and Information Management Section, 2015). Those students had great problems with analyzing abstract scientific concepts and processes.

In addition, the Brunei Ministry of Education has been introducing strategies for teachers to recognize the importance of technologically enabled devices to format teaching in classrooms. One example is the implementation of the Brunei's Teacher Standard (BTS) used to provide professional developments for teachers to use technology to teach and collect data in classroom action research. Another example is Whole School ICT Development (WSID) project which is designed to help teachers to plan their lessons from low order to the higher order thinking stages as the students and Inquiry-based science education (IBSE) projects are implemented to guide science teachers to plan their science lessons based on inquiry-based teaching and learning approaches with comprehensive teaching resources provided as references. A recent example is the outbreak of COVID-19 epidemic, teachers are left with no choice to teach virtually at home. Informed by these strategies, planning lessons needs to be very specific and informative; where teachers are required to be at one with their pedagogical content knowledge (PCK) (McCrory, 2008).

Research Questions

This study focuses on the effectiveness of the designed activities lessons of TELA to develop students' conceptual understanding of science. The research also hopes to see whether such understanding is retained even after the interventions for lifelong learning. Thus, the main research question is:

 "What are the effects of boost camp TELA on students' conceptual understanding of learning science?"

The main research question is used to understand how the science boost camps affect and develop students' conceptual understanding of science by comparing the pre-test as first (pre-test), second (post-test) and third (delayed post-tests) boost camps. The learning experiences themselves are understood by looking at students' interactions during the interventions in terms of KMO framework investigated.

As the study's research question needs to be answered both in numerical and narrative forms, a mixed methods research paradigm is used (Subedi, 2016; Yoshikawa and Kalil, 2008; Teddlie and Tashakkori, 2012 and Schulenberg, 2004).

Methodology Used

This research uses an explanatory sequential mixed methods approach to information gathering. The research model is designed to test the effectiveness of science boost camps lessons in developing a clear picture of combined science students' understanding of scientific concepts. As informed by Teddlie and Sines (2008), the quantitative and qualitative data are collected sequentially, analyzed separately, and then merged into a framework/ matrix/tabulation to reveal some indicators to the research questions' answers (*see Figure 1*).
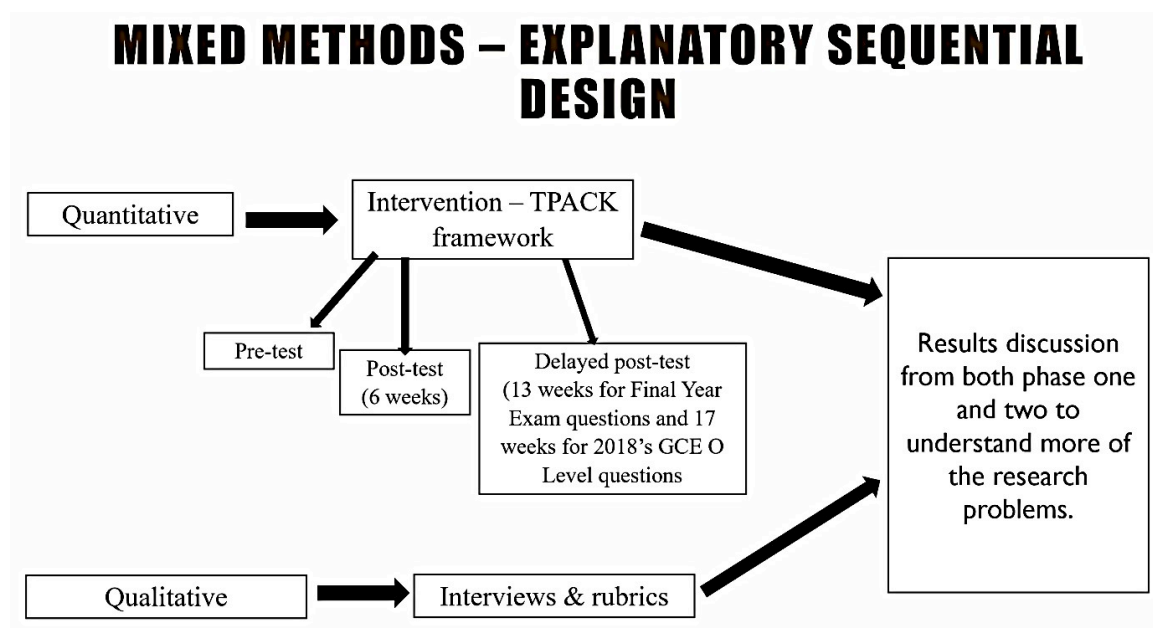
Figure 1: Diagrammatic process of the sequential study

The rationale for choosing a mixed-methods design is outlined below. To develop a clear conceptual understanding of the issues being investigated both quantitative and qualitative data are collected, because each method only provides a partial view of the complete picture (Creswell & Plano-Clark, 2011). This study will use data derived from both boost camps, together with students' feedback, as well as in-depth follow-up interviews of the involved students. The researcher can demonstrate the full benefits of using mixed analytical methods to highlight students' understanding of the concept of science during the interventions with the TPACK designed lessons.

Using the sequential design, a complete picture can be developed to portray a clear understanding of the effect of the TPACK-in-TELA designed lessons on high school students' test scores in combined science and their conceptual understanding of science.

Merging the quantitative and qualitative sets of data, which are then analyzed, can reveal a general picture via their test scores of the extent to which students grasp and understand the science concept. The researcher can also interpret the students' learning experiences through the TPACK-in-TELA designed lessons.

Teddlie and Tashakkori (2012) pointed out that the decision to use mixed methods should be based on research questions instead of focusing on the link between epistemology and methods. Similarly, Schulenberg (2004) noted out that the research questions should be the paramount focus of any investigation, rather than the study's methods (see Figure 2).
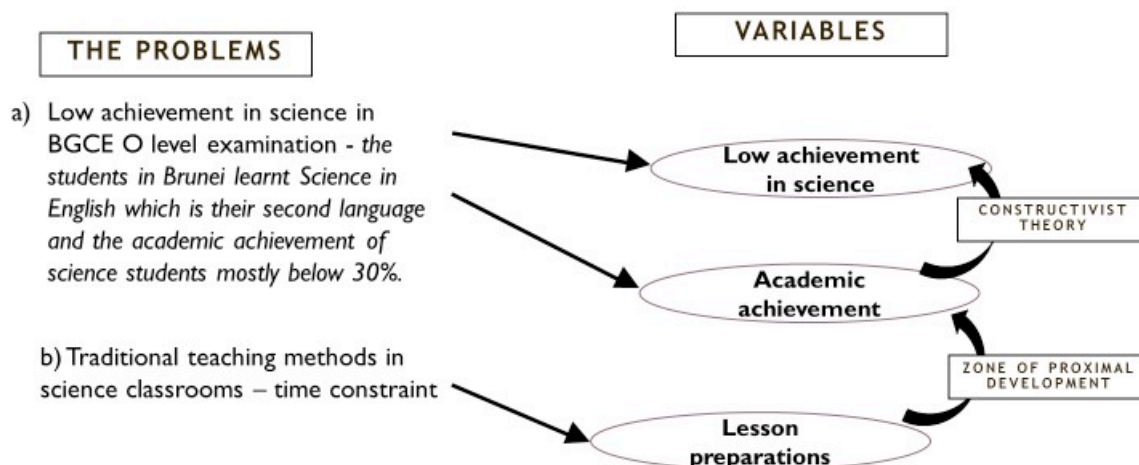
Figure 2: The representational diagram of this study's problems

This study frames the problems by incorporating the theory of Zone of Proximal Development and Constructivist Theory of learning. Both theories are important in this study as they are used as the guiding lens to capture the problem within the context of Bruneian's science classroom. In addition, students' conceptual understanding in TPACK-in-TELA as supported by Vygotsky's ZPD, will be seen through social interaction (in terms of gaining learning experiences) that will develop individual student's mental structures. The research questions and conceptual framework derived from the literature review combine to help develop the study's overall theoretical framework (*Figure 3*).
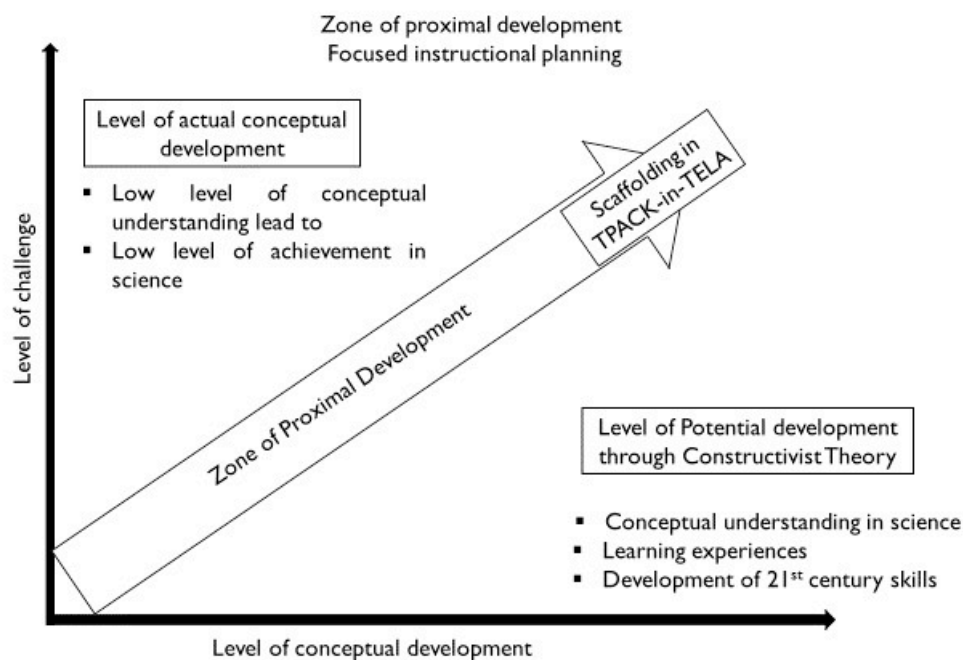
Figure 3: The theoretical framework of this study

As presented in the theoretical framework, the level of actual development in the study is affected by how the teacher planned the lessons. This process, according to a Vygotskian perspective, is helpful to expand a student's zone of proximal development (ZPD) to maximize their learning performance (Sharbini, 2016). Sharbini (2016) also stated that technology has shown itself to serve as a reliable source of scaffolding to facilitate positive changes in students' learning processes. In this study, the students' progress in their ZPD can be seen in their post-test achievement scores.

Evidence from the literature review highlights some of the following research gaps. Kafyulilo (2010) identifies that teachers are not properly integrating/incorporating TPACK components into their teaching. Chai et al. (2013) pointed out that TPACK is not used in lessons to measure students' achievements. However, Janssen and Lazonder (2016) claim that teachers' current TPACK use levels can act as a starting point for designing TPACK integrated lessons. Janssen and Lazonder (2016) also point out that there is very little evidence in the literature that can really demonstrate how teachers with developed TPACK knowledge can apply that knowledge to teach students to achieve better scores in science.

Study Sample

The sample of this study is selected from Bruneian year 11 students taking combined science who will be sitting for the O level examination in October 2023 as the first cohort of the new revised syllabus of 5129 combined science subject. The student sample was selected by using a probability sampling technique that aims to achieve reliable representation (Teddlie and Yu, 2007) of year 11 combined science students from selected schools. The sampling procedure for this study is to have students with different academic achievements participating in the tests/designed lessons so they have equal chances to experience revising science in boost camps of TPACK-in-TELA designed lessons.

Having achieved the desired sample, this study used stratified probability sampling to understand the existing relationships between TPACK-in-TELA designed lessons and students' learning experiences, as shown in Figure 8 below. There are 4 classes/groups of year 11 students who are going to take the combined science GCE O Level examination in 2023. The 4 classes are streamed/ chosen based on their achievements in English, Science and Mathematics from the lower secondary assessment in 2020 during COVID-19. These classes include students of 11A (general science education) and 3 classes of students taking 'general applied education': namely students of 11B, 11C1 and 11C2.

Students taking general applied classes (11B to 11C2) had scored below 40% in their lower secondary science assessment, whereas those students of 11 A achieved science scores of between 41% - 59%. Hence the students were selected from the same academic achievements/grades. Therefore, the students are already selected and arranged into groups of academic achievement levels in each of the 4 classes. In this case, the arrangement was employed simply to choose a representative sample from each stratum. The sampling process is further be clarified in Figure 4 below:
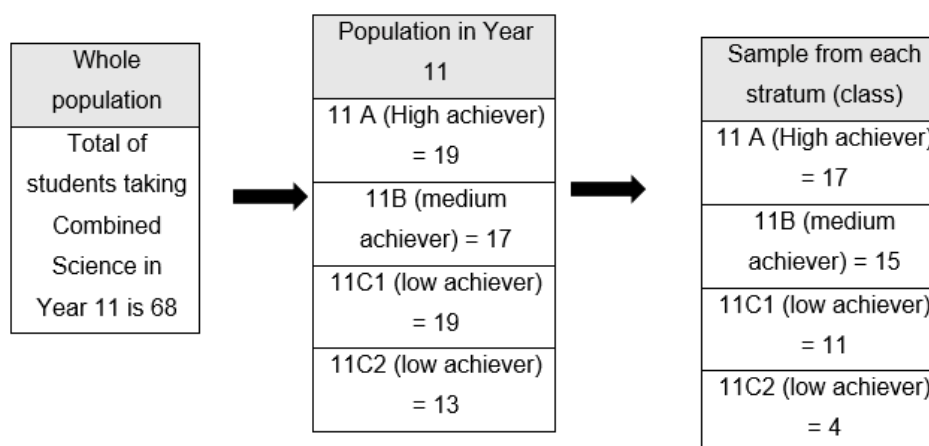
Figure 4: The process of probability stratified sampling

These students began learning science in the English language when they were still in the primary school. Combined science begins at the upper secondary level, i.e., year 9 until year 11; towards the end of the programme, students will be sitting for the Brunei Cambridge "O" Level examination. Schools in Brunei use the same science syllabus as is used in the United Kingdom (UK) (Sharifah, 1999). The objectives of assessment for this subject are focused mainly on conceptual understanding, handling scientific information, and solving problems related to daily life situations. The challenges that teachers faced during teaching the science lessons is that these objectives cannot be precisely specified in the syllabus content. Questions used in testing such skills are based on information which is unfamiliar to the students. In answering such questions, students are required to use principles and concepts that are within the syllabus and apply them to a novel situation in a logical, deductive manner.

The boost camps TELA lessons were designed using TPACK framework informed by constructivist theory. With the TPACK framework, Technological Enriched Learning Activities (TELA as the scaffolding) are injected into the boost camps lessons interventions in the four cycles of TPACK knowledge/learning programmes. The development of the interventions is explained in detail in the next section.

The third cycle was called the schematic knowledge dimensions where the students were required to collaborate with their peers to explain the solutions of the questions given to them. This boost camp took about 3 hours. The final cycle reflected on the strategic knowledge dimension of the TPACK framework focused on students' knowledge of 'where' and 'when'. At this phase, students learnt to apply the knowledge that they acquired from the previous cycles to come up with their solutions. The students are required to present their methodology using PowerPoint slides or video apps in the second boost camps. When all the cycles were done, the students were given post-tests.

Data Collection of Mixed Method

The sample for the qualitative data of this study was determined only after the post-tests; students with highest, medium, and lowest marks were chosen. The highest mark was the top scorer, medium was between 50% - 60%, whereas the lowest scorer was below 30%.
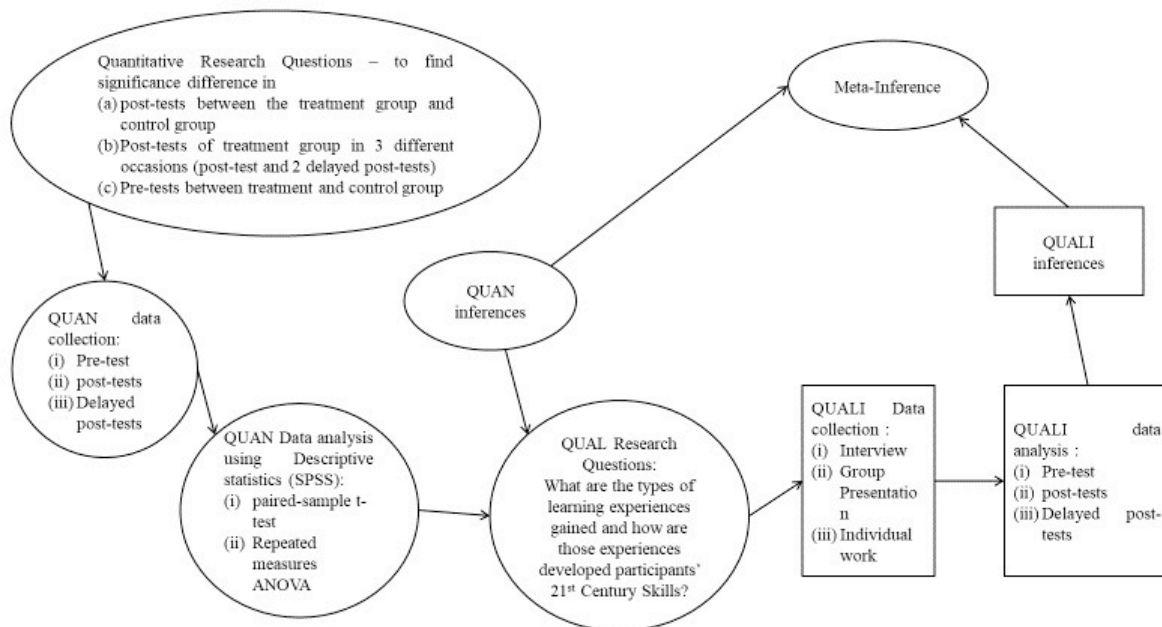
Figure 5: The sequential mixed methods design in which the research question of the second strand (QUAL) emerges from the findings of the first QUAN research questions. (QUAL = qualitative, QUAN = quantitative)

As for the types of quantitative and qualitative data collected, Figure 6 outlines the methods employed. There are 3 main types of data sources: i) test questionnaires (including pre-, post-, and delayed post-tests), ii) interviews and iii) direct observation during boost camps TELA lessons.
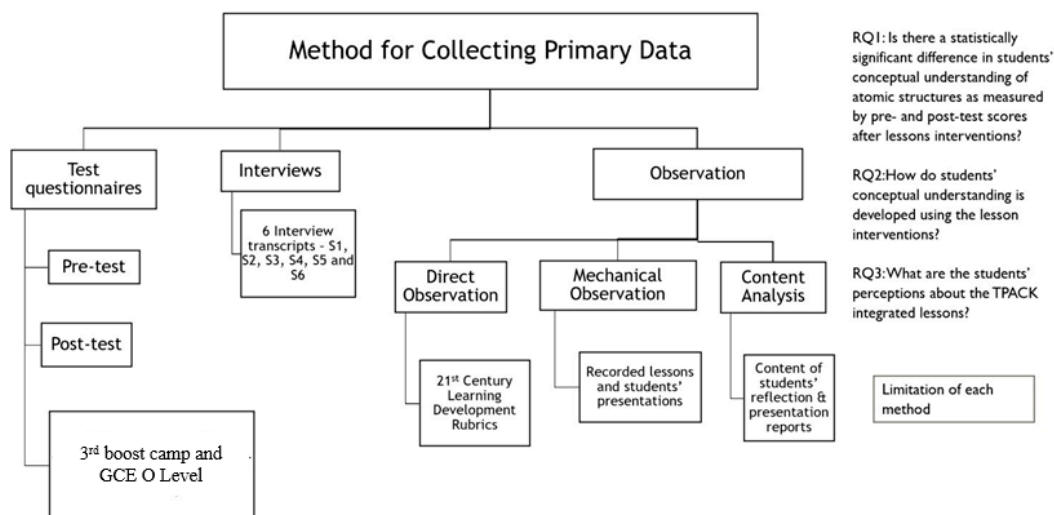
Figure 6: Methods for collection primary data

Details of the overall data collection and analysis are presented in the analytical framework, as shown in Table 2 below:

Phase	Procedure	Product
QUAN data collection	Pre-tests, posts-tests questions	Numeric data
QUAN data analysis	Descriptive statistics - paired-samples t-test or repeated measures ANOVA.	p value
Connecting QUAN and QUALI phase	Participants selection (random) and interview protocol development	Interview protocol
QUALI data collection	In-depth interview 21st Century LEAP learning rubrics	Textual data
QUALI data analysis	Coding and thematic analysis Theme development Cross thematic analysis	Codes and themes
Integration of both the QUAN and QUALI data	Interpretation and explanation of the QUAN and QUALI results	Discussion Implication Further research

Table 2: Analytical framework of this study

The initial analysis shows that the Science Boost camp was able to increase students' motivation and understanding of science concepts, the advantages of group work and active

learning. In addition, the effectiveness of the boost camp was discussed and evaluated for the next boost camp as part of students' intensive examination preparation for O level. This study summarized the essential attributes for a Science Boost Camp weekly course as the future development as one of the strategies for O level preparation.

This study adopts the process of mixing data from a method developed by Creamer (2018) to fully understand the effects of TPACK-in-TELA boost camps lessons on students' conceptual understanding of science and on their learning experiences. The process of mixing is summarized in Table 3 below:

Stages in this study	Strategies used to apply mixing
Research questions	The research questions are devised into 2 quantitative questions and 1 qualitative question, and 1 mixed method research question, denotes mixed method research questions.
Data collection	Analysis of the quantitative data in the first phase shapes the data collected in the second phase. Sequential mixed method (Creamer, 2018).
Sampling	Both the quantitative and qualitative samples are from the same sample. Stratified probability sampling is used.
Analysis	Merging both the quantitative and qualitative to answer mixed method research questions.
Interpretation and conclusions	Use of meta-inference to explain special phenomena discovered during analyses of both strands. Inconsistencies and consistencies are explained.
Reporting	Data analyses results are linked to the literature.

Table 3: The process of mixing of this study

Creamer (2018) mentioned the strategy of mixing both the quantitative and qualitative data during the analysis and interpretative stage to complement mixed methods research. She mentioned that both data can be integrated to produce a meta-inference that shows the whole phenomena of the study.

Cases	strategy	analytic focus	product
Each individual case: S1, S2, S3, S4, S5 & S6	Analytical immersion of each interview to identify important aspect of learning experiences	Within each case, close reading of each individual interview transcripts and summaries	Identification of learning experiences; coding themes
Across and within 2 high achievers, 2 medium achievers and 2 low achievers	Identify variations around themes of learning experiences across and within achievers	Data coding and representations	subthemes
Across all interview transcripts	Compares the themes of learning experiences across the 6 students	Meta matrices and cases summaries	Overall interpretations of learning experiences gained and 21st centuries skills developed.

Table 4: The analytical framework used in qualitative data analysis.

The interview transcripts labelled as S1, S2, S3, S4, S5 and S6 are transcribed by listening to the tape recorder again to look for themes related to the answer to the qualitative research question 3 of this study. This will be explained further after analysis of the interview transcripts and observation notes.

Research Question	Research objectives	Data sources	analysis
What are the types of learning experiences gained and how can those experiences be developed into participants' 21st century skills?'	To analyse the types of learning experiences that students gained in the interventions and to learn how those experiences shaped or helped the development of their 21st century skills.	(i) Students' interviews (ii) Students group presentations on their 3D model (iii) Observation notes	(i) Categorise each interview according to the types of learning experiences gained (ii) Use of 21st centuries and learning dimensions (CLD) presentation rubrics to look for types of 21st century skills developed. (iii) Re-categorise comments and notes that might indicate learning experiences or 21st century skills.

Table 5: The links between the research question, data sources and data analysis

Meta matrices approach of qualitative data analysis was employed to understand students' learning experiences gained in the study and how the students used these learning experiences to develop their 21st century skills for lifelong learning. This approach is done by combining microanalysis of the development of 21st century skills, the types of learning experiences gained and students' conceptual understanding of science as well as researcher's own experiences based on the strategy combinations listed in Table 5 above.

Results

Quantitative Results

The intervention is designed to increase students' science conceptual understanding. Students were given a range of questions on science concepts that required lower order thinking through to higher order thinking. The two variables used from the data were labelled as pre-testA and post-testA. Table 6 shows the results of the analyses from the pre- and post-tests of the students involved in the study.

```
T-TEST PAIRS=prtstA WITH posttstA (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

T-Test

[DataSet1] C:\Users\Yvonne YCC\Desktop\PhD\UBD_PhD\PhD thesis\2019\Data\9B1Treatment Grp.sav

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre-Test A	24.37	38	18.171	2.948
	Post-Test A	70.95	38	21.824	3.540

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Pre-Test A & Post-Test A	38	.371	.022

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Pre-Test A - Post-Test A	-46.579	22.640	3.673	-54.020	-39.137	-12.683	37	.000

Table 6: The results for the pre- and post-tests of the students involved in the study

The results, as shown in Table 6, were interpreted. A paired-samples t-test was conducted to evaluate the impact of the intervention on students' test scores regarding their science conceptual understanding. There was a statistically significant increase in the test scores from pre-test (M= 24.37, SD=18.17) to post-test (M=70.95, SD=21.82), t (37) =12.68, p < .001 (two-tailed). The mean increase in test scores was 46.58 with a 95% confidence interval ranging from 54.02 to 39.14. The eta squared statistics (.81) indicated a large effect size.

An analysis of the post-tests of the students who participated in the science boost camp for the three sessions is presented next. The research question is:

Quantitative research question 2: Is there a change in the 'conceptual understanding' test scores of the boost camp TELA interventions group over the three time periods?

Hypothesis: There is a significant difference in students' science conceptual understandings, as measured by the pre-tests, post-tests, and the delayed post-tests.

Quantitative research question 2 was used to evaluate the ability of students to retain science conceptual understanding; making sure students' learning was not just for the examination but lifelong. It was necessary to see the effectiveness of the boost camps intervention in the ability of the students to retain their science conceptual understanding on the same continuous scale at three different times through post-tests after: i) intervention, ii) end-of-year school examinations and iii) O- level examinations). To achieve this central objective one-way repeated-measures ANOVA analysis of variance was used to measure the test scores of the same participants at different points in time (within-subjects design).

A one-way analysis was employed because this study is looking at the impact of only one independent variable on the dependent variable. This technique will tell if or where there is a significant difference among the three sets of scores. Hence, a one-way repeated measure ANOVA was conducted to compares scores on the conceptual understanding with tests given at: a) pre-test (before the first boost camp intervention), b) post-test (after the first boost camp intervention) and c) the delayed post-tests (three weeks follow-up of third boost camp) on science concepts. The means and standard deviation are presented in Table 10. There was a significant effect of time as demonstrated by Wilks' Lambda = .02, $F_{(2,35)} = 7.43$, $p > .001$, multivariate partial eta squared = .30 (refer to Table 7 below).

Within-Subjects Factors

Measure: MEASURE_1

Time	Dependent Variable
1	posttstA
2	EoYB
3	OLevelC

Descriptive Statistics

	Mean	Std. Deviation	N
Post-Test A	70.35	21.809	37
End-of-Year Exams	64.14	17.789	37
BGCE O Level Exam	75.68	23.575	37

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Time	Pillai's Trace	.298	7.432[b]	2.000	35.000	.002	.298
	Wilks' Lambda	.702	7.432[b]	2.000	35.000	.002	.298
	Hotelling's Trace	.425	7.432[b]	2.000	35.000	.002	.298
	Roy's Largest Root	.425	7.432[b]	2.000	35.000	.002	.298

a. Design: Intercept
   Within Subjects Design: Time

b. Exact statistic

Table 7: Descriptive Statistics for test scores in conceptual understanding before, during and 3 weeks follow-up of the boost camps interventions

To see whether there are significant differences of test scores: i) before the first boost camp, ii) during the second boost camp and iii) after the three weeks follow-up third boost camp, a 'pairwise comparison' was conducted, with the results being shown in Table 8.

Time

Estimates

Measure: MEASURE_1

Time	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	70.351	3.585	63.080	77.623
2	64.135	2.925	58.204	70.066
3	75.676	3.876	67.815	83.536

Pairwise Comparisons

Measure: MEASURE_1

(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	6.216	3.037	.144	-1.409	13.841
	3	-5.324	3.845	.524	-14.978	4.330
2	1	-6.216	3.037	.144	-13.841	1.409
	3	-11.541[*]	3.119	.002	-19.372	-3.709
3	1	5.324	3.845	.524	-4.330	14.978
	2	11.541[*]	3.119	.002	3.709	19.372

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.298	7.432[a]	2.000	35.000	.002	.298
Wilks' lambda	.702	7.432[a]	2.000	35.000	.002	.298
Hotelling's trace	.425	7.432[a]	2.000	35.000	.002	.298
Roy's largest root	.425	7.432[a]	2.000	35.000	.002	.298

Each F tests the multivariate effect of Time. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

Table 8: The differences of each pair of time point showing students' conceptual understanding of science concepts

From Table 8 above, the differences between each pair of time points shown are all significant values of less than .05; thereby indicating that each of the differences is significant. The p value is less than .05; therefore, it can be concluded that there is a statistically significant effect for time. This outcome suggests that the students were able to retain their science conceptual understanding throughout the delay period described above. The results of analyses of the quantitative data have filled the gap relating to the ways in which teachers can design their lessons using a TPACK framework to improve students' conceptual understanding of complex scientific concepts.

Qualitative Results

The use of themes is driven to seek answers to the research questions by summarizing and analyzing the qualitative data from: a) the group presentations and b) interview transcripts of the six cases into the two central themes: i) learning experiences and ii) motivation to learn science. The case-based and theme-based approach is built on the visual display of data in a matrix of primary data summarization formed from: i) the group presentations, ii) the interview transcripts and iii) the observation notes.

In this study, 3 main themes were constructed to allow multiple data sources related to each student's learning experiences and motivation to be collated. Both the learning experiences and the student's motivation that was acquired are presented in terms of quotations from: a) the interview extracts, b) the students' work and c) the observation notes. This enabled to link

student's individual's learning experiences to their development of 21st century skills which lead them to acquire the conceptual understanding of science.

As informed by the research questions driving this study, the themes that emerged from the interview data analysis are grouped into three categories: i) learning experiences, ii) development of conceptual understanding and iii) motivation to learn science.

Points of Mixing for Mixed Methods

The process of mixing differing classifications of data in an analysis, by merging both the quantitative and qualitative, is to answer the mixed method research question (Creamer, 2018). Creamer (2018) describes five strategies for mixing quantitative and qualitative data and analytical strategies: (i) blending, (ii) converting, (iii) extreme case sampling, (iv) cross-case comparisons, and (v) meta-inferences. For this study, to complement a mixed method study, data transformation is achieved by quantifying the qualitative data, in the form of frequency counts, to enable statistical analysis to take place whereas the mixing strategy used is meta-inferences.

This study found that besides understanding the science concepts, the students need pedagogical knowledge (PK) to explain to their peers the content knowledge (CK) of science concepts. It was interesting that from the data analysis, the students have a good background knowledge of using the internet and ICT (technological knowledge, TK) to prepare their solutions and technological pedagogical knowledge (PCK) when they prepared their group presentations.

The final synthesis from meta-inferences was collectively drawn from the findings that were yielded by both approaches. The quantitative findings suggest that the TPACK-in-TELA has helped to develop students' science conceptual understanding; particularly as students were able to retain their understanding over extended periods of time. This outcome suggests that TPACK-in-TELA can be used by science teachers to teach science to facilitate lifelong learning with and for their students. Based on the analysis, the meta-inferences for each individual case were constructed to link the learning experience to development of 21st century skills. The final categories were learning experiences in Content Knowledge (CK), Technological Knowledge (TK), Pedagogical Knowledge (PK) and Technological Content Knowledge (TCK).

As shown by the data analyses in this study, learning experiences gained by the students are associated with motivation to understand the concepts they learn in science. The students' conceptual understanding was shown through their 21st century skills development. The students gained science conceptual understanding when they develop their communication, knowledge building, self-regulation, the use of ICT, collaboration, and real-world problem-solving skills. The emergence of students' learning experiences and motivation from the qualitative data analysis are linked in meta-inferences in the next section to show a deeper understanding of those students' achievements in science.

The quantitative findings suggest that students' conceptual understanding changes after the boost camps interventions with TELA. Analysis from the qualitative interviews provided some evidence as to the possible changes. First, those students explained the learning experiences helped them to achieve science conceptual understanding. Second, the case study enhances our understanding that students with different abilities were able to increase the

motivation to learn science and improve their 21st century skills through the learning experiences they described in the interviews. As informed by the results of both the qualitative and quantitative data analyses, the stages of developing students' science conceptual understanding during this study are summarized in Figure 7,
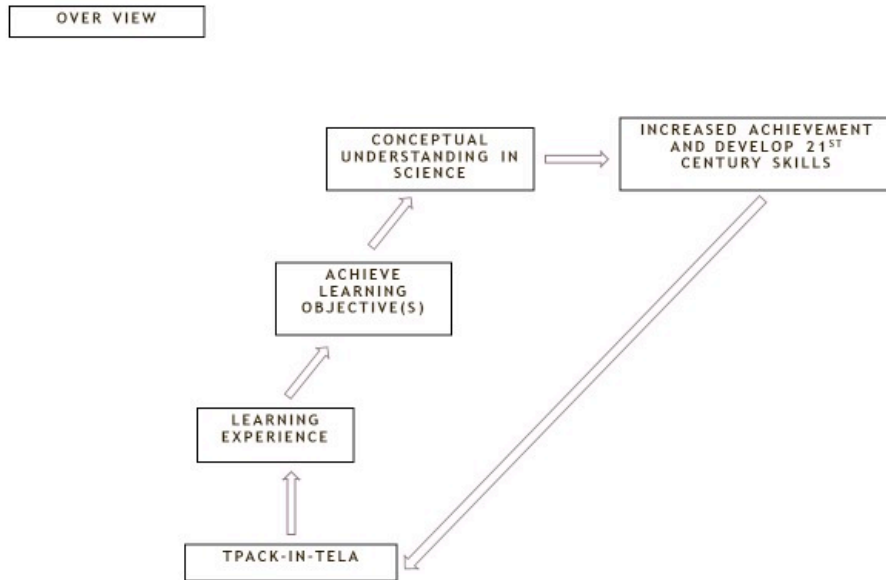
Figure 7: the stages of developing students' science conceptual understanding during this study

Third, the definition of the CK, TK, PK and TCK of TPACK components in the findings of this study based on Mishra and Koehler (2006) is presented in Figure 8, which shows the relationships between the students' PK, CK, TK and PCK in this study.
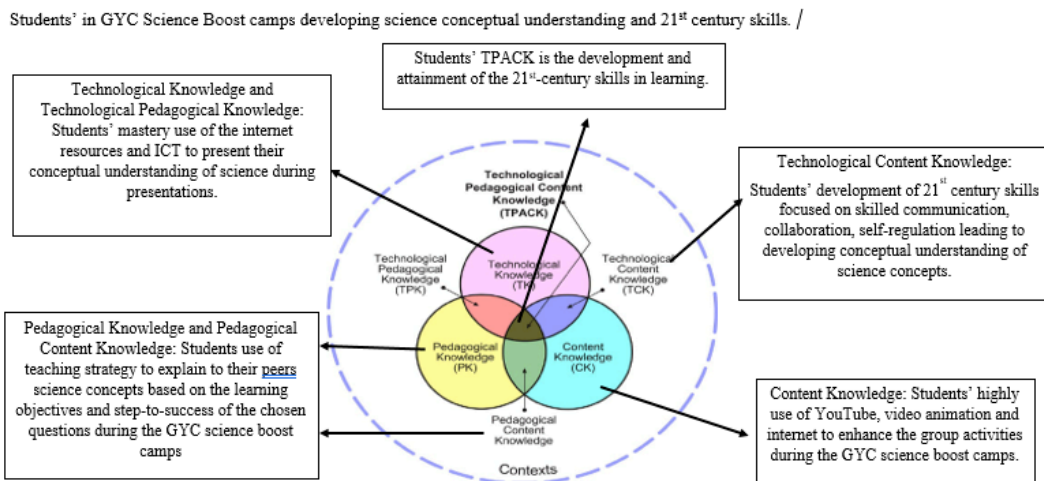
Note: Based on Mishra, P., & Koehler, M.J. (2006) Technological Pedagogical Content Knowledge: A new framework for teacher knowledge.

Teachers College Record, 108(6), 1017-1054.

Figure 8: Results of this study based on Mishra, P., & Koehler, M.J. (2006) Technological Pedagogical Content Knowledge: A new framework for teacher knowledge.
(Teachers College Record, 108(6), 1017-1054.)

The results of this study have shown that hands on activities helped students visualize science concepts and make connections between the concepts and the solutions to the questions. The effectiveness of the learning activities and instructions requires students to be able to visualize and make connections between representations of the same phenomena (Ardac and Akaygun, 2003). Second, the hands-on activities in the boost camps have shown that teachers can use these interventions to measure students' achievement in science filling the gap raised by Chai, *et.al.,* 2013 and Janssen and Lazonder, 2016. In line with the government's vision to improve students' achievement in the BGCE 'O' Level Examination in Combined Science, the results will also provide useful insights to policymakers or educators to design curriculum based on TPACK framework.

Supported by literature review in this paper, the ability of the students shown in constructing their presentation slides from their prior knowledge gained in the declarative stage fits into the constructivist framework which emphasize the importance of building on the learner's prior knowledge to construct new knowledge.

Discussion and Conclusion

The use of technology in teaching and preparation of technologically enriched learning environments in this study required high motivation from the teachers. The need to start to respond to the challenges of globalization and the digital age of teaching and learning as the world has been developing very rapidly with industrial revolution 4.0 resulting in all sectors seek to apply and integrate technology (Purwaningsih, et.al., 2019).

It can be concluded that teachers need to be given more trainings to plan their lessons using technology in curriculum design by giving them more professional development in technology integration. Correspondingly, Purwaningsih, et.al., (2019) mentioned that teachers must experience a paradigm shift in teaching and learning where technology does not only serve as a tool to aid instructions but also function as a tool that benefits students' learning.

Even Mishra and Koehler (2006) argued that TPACK knowledge is created when teachers employ their technological, pedagogical, and content knowledge to create specific technology integration strategies. Hence, the use of TELA in this study, the specific technology-integration strategies referred to pedagogical strategies in creating TELA for Bruneian students in learning science. Likewise, the integration of technological knowledge, pedagogical knowledge and content knowledge in TELA helped to accelerate students' conceptual understanding, improve students' motivation to learn science and develop students' attainment of 21st -century skills.

To develop and implement teaching techniques for meaningful learning, each teacher needs to be fully knowledgeable in terms of his or her content knowledge (CK) and pedagogical knowledge (PK). Even researchers (Mishra & Koehler, 2006; McCrory, 2008) have argued that besides CK and PK teachers also need to master technological knowledge (TK). When combined, these three bodies of knowledge (CK, PK and TK) form a framework for technological inclusion (Mishra & Koehler, 2006). Therefore, it is suggested that, when it comes to science subjects, science teachers need to upgrade not just their content knowledge and pedagogical knowledge, but also their technological knowledge.

The present study indicates that student achievements can be enhanced through TELA that are student-centred and characterised by TPACK's backward designs. Based on the findings of this approach, it could serve as a guide for teachers to implement the TELA, especially amongst students with different academic abilities, because the elements of the approach are suited for learners with different abilities (Arıkan, 2018).

Nevertheless, to drive the Brunei's Wawasan 2035 all parties (Ministry of Education, school leaders, teachers, researchers, students and parents) are interdependent of each other, and teachers can help the change by providing evidence from their own authentic classroom settings through the *ecology of educational change* (Deng, 2019).

Acknowledgements

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Career-Related Parental Behaviours and Senior Secondary Students' Career Development in Underdeveloped China

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Abstract

Parents are major socializers for senior secondary students' career development. Prior research has investigated parental influence and highlighted typical types of parental support. While parental support highly interplays with other career-related behaviour, limited research explores the career-related parental behaviour (support, intervention, engagement) on senior secondary students' career adaptability, especially in underdeveloped areas of China. Therefore, this study investigated the impact of career-related parental behaviour on career adaptability among senior secondary students in underdeveloped regions of China. Drawing on a sample of 838 senior secondary students in Meizhou, Guangdong Province (Mage=17.51, SD=0.89, 50.7% Female), this study adopted a person-centred approach to evaluate career-related parental behaviour and their corresponding influence on students' career adaptability. Results recognised two types of parents ("authoritative" and "warm and supportive") regarding their career-related behaviour. Senior secondary students in the "warm and supportive" group show higher career adaptability than those in the "authoritative" group, specifically in control, curiosity, and confidence. However, no difference in concern is found between the two groups. These results emphasise the value of the person-centred approach in understanding parents concerning their career-related behaviour in underdeveloped China. Furthermore, it suggests that although filial piety is valued in Chinese culture, parents need to let their children go. It will benefit senior secondary students more through active support and engagement in career development. With a new understanding of parents and their impact on senior secondary students' career adaptability in underdeveloped China, this study lays a foundation for future research and practical interventions.

Keywords: Career-Related Parental Behaviour, Senior Secondary Students, Career Adaptability, Underdeveloped China

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Introduction

Parents have a central role in senior secondary students' career development in the family context. Empirical research articulated that senior secondary adolescents rated their parents as one of the most important others (Ho, 2015) to discuss career-related topics (Otto, 2000). Besides, adolescents' career interests, intentions, and goals, as well as their career-related self-efficacy and outcome expectations are under the great influence of their parents through their daily interaction in the family context (Kenny & Medvide, 2013; Lent et al., 1994; Liu et al., 2015). Acknowledge the great impact of parents, prior research identified two types of influence in the family context: the structure variables (e.g., parents' education or occupation) and the process variables (e.g., parental aspirations, parental support, and parent–child relationships), with family process variables are suggested to shape youth's career decision-making self-efficacy more profoundly comparing with structural variables (Hargrove et al., 2005). However, parents are not simply influence their children through single and seperate variable, instead through combined and interrelated behaviours. The understanding of career-related parental behaviours will provide a more comprehensive picture of the way parents are involved in their children's career development, contributing to guiding parents to support their adolescent children's career development. Therefore, this research delves into career-related parental behaviours as the process variable to get insight into the types of career-related parental behaviour, and their effect on senior secondary students' career development.

Senior Secondary Students' Career Development and Career Adaptability

Globalisation and technological development have led to a changing and uncertain world (Santilli et al., 2020). In this context, it is hard to predict an industry's future, contributing to the challenges for adolescents to make a career decision (Savickas et al., 2009). Accordingly, in the world characterised by frequent transitions, Savickas (2005) proposed a career construction theory, which explains individuals' behaviour in managing vocational tasks, transitions, and traumas (Savickas, 2013).

As a core assumption in the career construction theory, career adaptability denotes the psychological resources adolescents seek in constructing their careers and dealing with developmental tasks in frequent transitions (Savickas, 2005). Career adaptability is a psychosocial construct that provides four sub-dimensions to evaluate adolescents' career development. The four sub-dimensions of the framework of career adaptability comprise career concern, career control, career curiosity, and career confidence (Savickas, 2005; Savickas & Porfeli, 2012). Career concern is the first and most important sub-construct that implicates individuals' orientation to future career acts and the awareness of planning for transitions. Career control refers to individuals' sense of control of the future and involves career decision-making skills. Career curiosity means curiosity about the self and the environment, involving information seeking about the self, the world of work, and the desired future. It appears when individuals think about themselves in different situations. Finally, confidence shows individuals' confidence in dealing with developmental tasks. It will aggregate during the exploration experience. As the world of work shifts from stable to ever-changing, career adaptability is viewed as a critical ability to face the challenges and uncertainties posed by the constantly changing society (Luthar & Brown, 2007; Rossier, 2015; Santilli et al., 2014). Empirically, career adaptability benefits individuals' career development (e.g., Rudolph et al., 2017; Yu et al., 2018), academic performance (Negru-Subtirica & Pop, 2016) and individuals' well-being (e.g., Wilkins et al., 2014; Santilli et al., 2020). Given that senior secondary students will soon face the transition from secondary

education to postsecondary education/employment and make their career decisions, investigating the antecedents of career adaptability will provide valuable implications to support their children's smooth transition.

Parents and Senior Secondary Students' Career Adaptability

Acknowledge the significance of career adaptability in a dynamic society, prior research has identified individual antecedents and relation factors of career adaptability. Individuals' hope, self-esteem, cognitive flexibility, and environmental exploration positively predict their career adaptability (Chong & Leong, 2017; Ginevra et al., 2016; Hui et al., 2018). Meanwhile, parents also play a profound role in shaping their children's career adaptability through interaction with children. For example, parental career support positively correlates with adolescents' career adaptability (Hirschi, 2009). Similarly, Lee (2018) investigated 581 Korean senior secondary students and found that parental career-related support mediates the association between students' family socio-economic background and their career adaptability. Besides, parental career expectation on their children has demonstrated an association with senior secondary students' career adaptability (Zhou et al., 2023). While parental structural variables (e.g., SES) and process variables (e.g., expectation, support) are pointed out to have a salient impact on adolescents' career adaptability, this research argues that the behavioural dimension is especially of value because it could inform career counsellors of the details understanding of how parents behave in their children's career development, contributing to providing interventions for parents to facilitate children's career development in the future.

Endorsing the importance of parental behaviours, Dietrich and Kracke (2009) identified three major components of parental career-related behaviour: support, interference, and lack of engagement. Parental support, which involves parental financial support, resources support, networking support (Borgen & Hiebert, 2006) and emotional support (Hou et al., 2010) for adolescents' career development, is widely investigated in existing research (e.g., Alfianto et al., 2019; Ginevra et al., 2015) and positively correlated with students' career development. Prior research articulated that greater parental support lead to students' higher career decision-making self-efficacy (Gushue & Whitson, 2006; Keller & Whiston, 2008), career self-efficacy (Turner & Lapan, 2002), career expectations (Zhou et al., 2023), career aspirations (Ma & Yeh, 2010), more career exploration (Dietrich & Kracke, 2009) and career certainty (Constantine et al., 2005), as well as lower career-related stress (Dietrich & Salmela-Aro, 2013) and career salience (Diemer, 2007). However, the consideration of parental support is accompanied by considering its type and the frequency. Besides, it also interconnects with other factors like time and resources. Some parents may also have barriers to engagement, such as a lack of time and knowledge to support their children's career development. Therefore, it needs further consideration of other interconnected factors. Previous research shows that some parents tend to place their views and expectations of individual career development on their children (Young et al., 2001), consistent with Liu et al.'s finding (2015) that parents try to influence their children's career aspiration by intentionally fostering children's career values, interests, attitudes, and even interpersonal skills rather than simply enforce their children to obey their views and expectation.

While empirical studies have recognized the pivotal role of career-related parental behaviours consisting of support, interference, and lack of engagement in shaping adolescents' career adaptability (Dietrich & Kracke, 2009; Guan et al., 2015; Liang et al., 2020), there is limited understanding of the profile of career-related parental behaviours received by senior

secondary students. Notably, Zhou et al. (2020) and Liang et al. (2023) have adopted a person-centred approach to identify different types of parents based on their career-related parental practices. However, few research focuses on the detailed impact on students' career adaptability and its sub-dimensions among students in underdeveloped areas in China. In case career and life planning education is limited available in the major cities in China (Xiao, 2018), senior secondary students from underdeveloped regions are vulnerable regarding their career development in China. Since family SES influence individuals' career development through parental career-related support (Lee, 2018), along with that parents are one of the social resources for senior secondary students' career development, parents' career-related behaviours for their senior secondary children in underdeveloped China may present different pattern as existing research. In view of the above literature review, the current study proposes the following two research questions guiding the investigation:

RQ1: What types of parents can be identified based on senior secondary students' perceived career-related parental behaviours in underdeveloped China?

RQ2: Are there differences in career adaptability among senior secondary students with different types of parents in underdeveloped China?

Methodology

Participants

This study adopted random sampling to obtain students' ratings of career-related parental behaviours and their career adaptability. In total, 838 senior secondary students (M_{age}=17.51, SD=0.89, 50.7% Female) from four public senior secondary schools in Meizhou in this study. Meizhou is a Hakka community on the border of Guangdong province, China. The GDP per capita income was less than half of the per capita income in China in 2020, indicating that it is an underdeveloped city.

Measures

The 15-item Parental Career-related Behaviors scale developed by Dietrich and Kracke (2009) is adopted to understand career-related parental behaviours. The scale comprises three sub-dimensions: support, interference, and lack of engagement. Each dimension consists of 5 items. As per the previous adoption by Zhou et al. (2020), this research adopted 5 points from 1 (does not apply at all) to 5 (fully perfectly) instead of the original 4 points. The reason for using the five-point Likert scale is its accuracy. The scale shows good validity and reliability (Zhou et al., 2020), and Cronbach's α in this research are .92 (support), .91 (interference), .90 (lack of engagement).

As for career adaptability, the Chinese version of the Career Adapt-Abilities Scale–Short Form (CAAS-SF) developed by Yu et al. (2019) is adopted in this research due to senior secondary students' heavy study task. It is a 12-item scale investigating concern, control, curiosity, and confidence. Each sub-dimension consists of 3 items. It is also a five-point Likert scale from 1 (not strong) to 5 (strongest). The scale shows good validity and reliability (Yu et al., 2019), and the Cronbach's α in this research are .92 (concern), .87 (control), .87 (curiosity), .88 (confidence).

Data Analysis

To identify the types of parents in terms of senior secondary students' reported parental career-related behaviours, cluster analysis is used to obtain a distinctive cluster of parents based on the parental career-related behaviours. Cluster analysis has been wildly seem and used as an appropriate technique to formulate clusters within data without explicitly label (Sun et al., 2017). It allows the identification of clusters of respondents according to the similarity of their responses to the given scale (Hair et al., 2014). This study first adopted hierarchical cluster analysis using Ward's clustering method based on "Euclidean distance" to decide the cluster number. A following k-means cluster was run to group parents into two types.

To further compare senior secondary students' career adaptability between students with different types of parents, five independent-sample t-tests were run to compare the means of senior secondary students' overall career adaptability and the sub-dimensions, namely concern, control, curiosity, and confidence.

Results

The hierarchical cluster analysis results (see Table 1) reveal that the highest percentage increase in heterogeneity is observed between the last two stages, i.e. 837 and 836 (25.25%). Therefore, this study decided to cluster parental career-related behaviour into two groups. The descriptive data of the two groups indicates that parents could be categorised into "authoritative group" and "warm and supportive group (see Table 2).

Table 1: Summary-statistics of hierarchical Clustering

Stage	Cluster 1	Cluster 2	Distance coefficient	No. of the cluster after the combination	Difference	% increase heterogeneity
835	1	571	15.53	3	0.31	2.46%
836	1	2	15.84	2	4.00	25.25%
837	1	21	19.84	1		

Table 2: Descriptive statistics of two groups of parental career-related behaviour

	Mean	
	Cluster 1	Cluster 2
Support	3.42	3.66
Interference	3.30	2.12
Lack of engagement	3.01[a]	4.01[a]

a. scores have been reversed.

The results of the independent-sample t-test reveal the differences in senior secondary students' career adaptability in Table 3. There are significant differences between authoritative group and warm and supportive group regarding senior secondary students' career adaptability, t (836)= -4.06, p＜0.001(two-tailed), 95% CI of the difference between means=(-0.26, -0.09); career control, t (836)= -4.78, p＜0.001(two-tailed), 95% CI of the

difference between means=(-0.32, -0.13); career curiosity, t (836)= -3.92, p＜0.001(two-tailed), 95% CI of the difference between means=(-0.28, -0.09); career confidence, t (836)= -3.53, p＜0.001(two-tailed), 95% CI of the difference between means=(-0.26, -0.07). However, there is no significant difference in career concern between the authoritative group and the warm and supportive group, t (836)= -2.41, p=0.016(two-tailed), 95% CI of the difference between means=(-0.23, -0.02).

Table 3: Summary-statistics of K-means Clustering

	Mean		SD		t
	Cluster 1	Cluster 2	Cluster 1	Cluster 2	
CA	3.55	3.73	0.63	0.63	-4.06***
Concern	3.40	3.52	0.72	0.77	-2.41
Control	3.62	3.85	0.69	0.68	-4.78***
Curiosity	3.59	3.79	0.70	0.70	-3.92***
Confidence	3.60	3.76	0.69	0.69	-3.53***

CA= career adaptability. ***P < .001.

Discussion

The Types of Parents

The k-means clustering analysis identified two types of parents, one shows intermediate support, interference, and engagement, while the other represents high-level engagement and medium-level support, as well as low-level interference. The former is similar to the authoritative parents, who are responsive and supportive but still maintain high control simultaneously (Baumrind, 1991). However, the later highly engaged and supportive parents expressed more warmth and presented less control with lower interference. While Meizhou city ranked as the last in Guangdong and only had half of the per capita income in China, students from Meizhou may be from socially disadvantaged backgrounds compared to their city counterparts. However, although prior research believes that parents' SES is linked to ideal parenting practices related to individuals' career and life development (Bryant et al., 2006), this research breaks the stereotype of parents in rural China to some extent. Although coming from geographically vulnerable areas, parents identified in this research show medium to high support and engagement based on senior secondary students' perceived parental career-related behaviours. Due to the underdevelopment of the Meizhou economy, there are few employment paths. The number of people employed by state-owned units accounts for a large proportion of the number of people employed by urban non-private units in the city, with 54.4% of people employed by state-owned units in Meizhou, which is stable and relatively easy to do (Meizhou Municipal People's Government, 2017). Therefore, they have more time and resources to invest in their children's development. Furthermore, despite the fact that more than half of the people work in state-owned organisations, they continue to value education, which allows their children to have a better development without being restricted by the underdeveloped region.

The Differences Between Students' Career Adaptability Between Students With Different Types of Parents

Independent t-tests confirmed the differences in senior secondary students' career adaptability, specifically career control, curiosity and confidence among senior secondary students with different parents in underdeveloped China. In other words, the results suggest

the impact of parental career-related behaviours on senior secondary students' career adaptability, except for the sub-dimension of career concern. The results are similar to previous research show different overall career adaptability among senior secondary students with different types of parents (Zhou et al., 2020). In terms of the insignificant differences in career concern among senior secondary students with different types of parents, it may be due to the overall relatively lower level of career concern among senior secondary students in China (e.g., Guan et al., 2015; Leung, 2022). Career concern refers to the consideration of future direction and planning awareness. Since students in the Chinese context are under great learning pressure and their major goal is to excel in the college entrance examination (Gaokao), thus they usually prioritise academic performance over career and life development. Even though parental career-related behaviours impact senior secondary students' career adaptability, parents also think education is a social ladder to move to a higher social status, contributing to the importance of academic performance in the Chinese context.

Conclusion

This study investigated the types of parental career-related behaviours and their impact on senior secondary students' career adaptability. The results categorised parents into "authoritative parents" and "warm and supportive parents". Senior secondary students with warm and supportive parents showed higher career adaptability, career control, career curiosity, and career confidence. However, there is no significant difference in career concern among students with authoritative parents and warm and supportive parents. The findings suggest that senior secondary students benefit from their parents' active support and engagement in their career development. Parents supporting their children could consider reducing their control on children and letting children go appropriately to explore themselves and the external environment.

However, this study is limited in two aspects. Firstly, the differences between senior secondary students' gender were not explored in this research; Secondly, this study only examined the impact of parental career-related behaviours on senior secondary students' career adaptability, ignoring the potential moderating effect of parental' structural factors (e.g., parents' education background, parents' work statues). Future studies could explore parental career-related behaviours for male students and female students. Future research could also consider the possible variables in senior secondary students' career adaptability in underdeveloped cities in China, for example, parents' work status and the differences between left-behind students and non-left-behind students.

Acknowledgement

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The Use of Virtual Tabletop for Revising Electron Counting in Inorganic Chemistry

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Abstract

Electron counting of metal complexes is an important skill for chemistry undergraduate students learning inorganic chemistry. As part of game-based learning, we have developed a card game termed "CountQuest" for students to revise electron counting after learning this concept from conventional lectures. In this proceeding, we describe the use of a free web-based virtual tabletop platform, playcards.io for implementing an online version of CountQuest due to COVID-19 restrictions in 2021. Pre- and post- game surveys indicated that students' confidence in electron counting improved to a large extent. Pre- and post-game quiz results at 5% significance level indicated that there is a significant difference between quiz scores. The students' perception of confidence in electron counting showed improvement after playing CountQuest in all three years that the game was played, independent of the mode of delivery of the game (physical or online).

Keywords: Game-Based Learning, Virtual Tabletop, Electron Counting

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Introduction

Electron counting is a foundational concept for inorganic chemistry. Metal complexes are compounds that consist of a central metal center (M) surrounded by electron donating ligands (L). The electron count of octahedral metal complexes is typically 18 (thus "18-electron rule") due to the filling of 9 bonding molecular orbitals while the antibonding orbitals are vacant (Sidgwick, 1934). As part of the learning objectives for the module CM2111: Inorganic Chemistry 2, students are expected to perform electron counting of metal complexes by adding the valence electron count from the metal center and ligands respectively. Achieving proficiency in electron counting after learning this concept in lectures typically involves voluminous practice. To enable students to practice electron counting in an interactive and fun fashion, we have adopted game-based learning. In the review by Plass et al. (2015), four key arguments were made for games as an effective learning environment, namely: motivation, player engagement, adaptivity and graceful failure. Inspired by a card game (Thammavongsy, 2020) in the literature, we have developed an educational card game termed "CountQuest" (Tan et al., 2022, Foo & Ang et al. 2023) for revising electron counting concepts taught during CM2111 lectures.

CountQuest utilizes separate metal and ligand card decks (Figure 1). The game is played in groups of 3-5 students and seven ligands cards from the ligand card deck are distributed to each player. Game play starts by revealing a metal card in the metal card deck, followed by players taking turns to place their ligand cards till a certain electron count (typically 18) is reached for the metal complex. Since education games allow for scaffolding of learning (Melero et al., 2011), the players will initially start off with labelled and then proceed to unlabelled ligand cards to increase the difficulty of the game since students will need to use their chemical knowledge to obtain the electron counts of ligands. Ligands were classified based on the Covalent Bond Classification (CBC) or LXZ method developed by Green (1995).
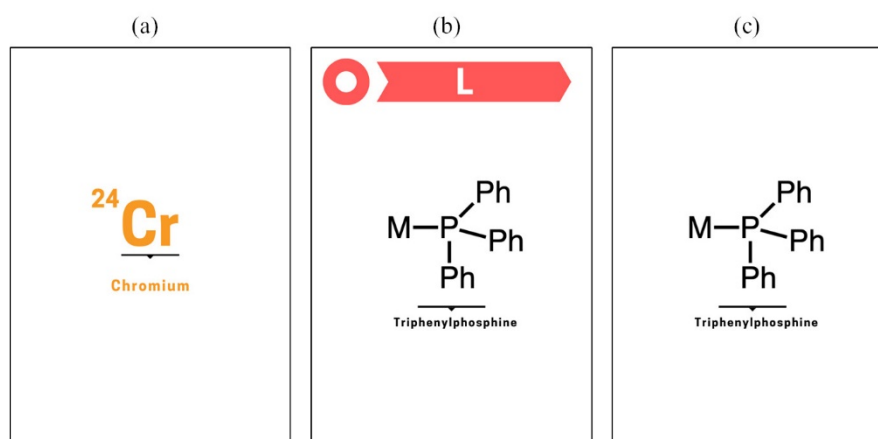
Figure 1: (a) Metal card (b) labelled Ligand card (c) unlabelled Ligand card

In 2019, the first version of CountQuest was mounted using physical cards and the game was played face-to-face in groups of three to five players. In 2020, due to Covid -19 restrictions, all tutorial classes were held online. The game was played online using Zoom with the group facilitator starting the game by screen-sharing a Powerpoint slide with a metal card, followed by the players sketching ligands using the Zoom annotate feature. We have written about this digital version of CountQuest in our previous publication (Tan et al., 2022). This version of CountQuest had some drawbacks as the card deck for each player was pre-assigned and

facilitator had to track each card played by the players, which was cognitively demanding for the facilitator.

In 2021, as Covid-19 restrictions continued, an alternative approach was used to mount CountQuest online using a web-based virtual tabletop found on www.playingcards.io for better game mechanics and experience. A virtual tabletop is a digital platform that enables players to meet online and play existing or customized tabletop games (such as board, card, role-playing games) with a playing experience resembling a physical game. Playingcards.io is web-based, free to use and many common card and board games can be found there. More importantly, it allows users to build customized game rooms and import customized card decks and boardgames via a user-friendly interface. This makes it a useful online platform for designing and hosting tailored educational games such as CountQuest. The use of playingcards.io for hosting educational card games during the Covid-19 pandemic is not new (Wilson, 2020). It is important to note that since there is no communication platform in this virtual tabletop, players will have to use existing digital platforms such as Zoom, Skype, WhatsApp, etc to communicate with each other.

Our current work attempts to investigate the following research questions (RQs):
> RQ1: What are students' perceptions of content mastery of electron counting after playing CountQuest?
> RQ2: Do students perform better in an electron counting quiz after playing CountQuest?
> RQ3: How do students perceive CountQuest as a method of learning?
> RQ4: How do students perceive playing CountQuest on a virtual tabletop?

Research Methodology

The study was carried out in a one-hour tutorial session of CM2111 (mandatory year 2 undergraduate inorganic chemistry course) during fall semester of 2021. Students learnt electron counting during a 1.5-hour lecture session and completed a tutorial on the topic about a month before the game session. 79 students participated in this study. Participants completed a pre-game survey and quiz before the game session and a post-game survey (with additional questions) and quiz at the end of the game session. Surveys and Quizzes were conducted in NUS's proprietary Learning Management System, LumiNUS.

Implementation of CountQuest in playingcards.io

The "Custom Room" feature of playingcards.io was used to create the customized game room for CountQuest (Figure 2). The game rules, simplified periodic table for transition metals, Turn and Metal card counter (Figure 2) were added to the gameplay area using the "Edit Table" function. Metal and Ligand cards were imported to their respective decks using the "Custom Card Deck" and "Custom Holder" features. Similar to a physical game, players use the mouse button to play Ligand cards from their hand to the gameplay area, draw and flip Metal and Ligand cards during gameplay. A game round begins by flipping a Metal card, players then play Ligand cards to increase the electron count of the complex to reach its required value. If a player runs out of Ligand cards in their hand to play or cannot play a Ligand card without exceeding the required electron count, they must draw a Ligand card from the deck. The player who played the Ligand card that fulfills the required electron count of the complex and correctly says the oxidation state and *d*-electron count wins the round. To

keep track of the number of rounds each player won, the facilitator will increase the respective player's Metal card counter for each round they win.
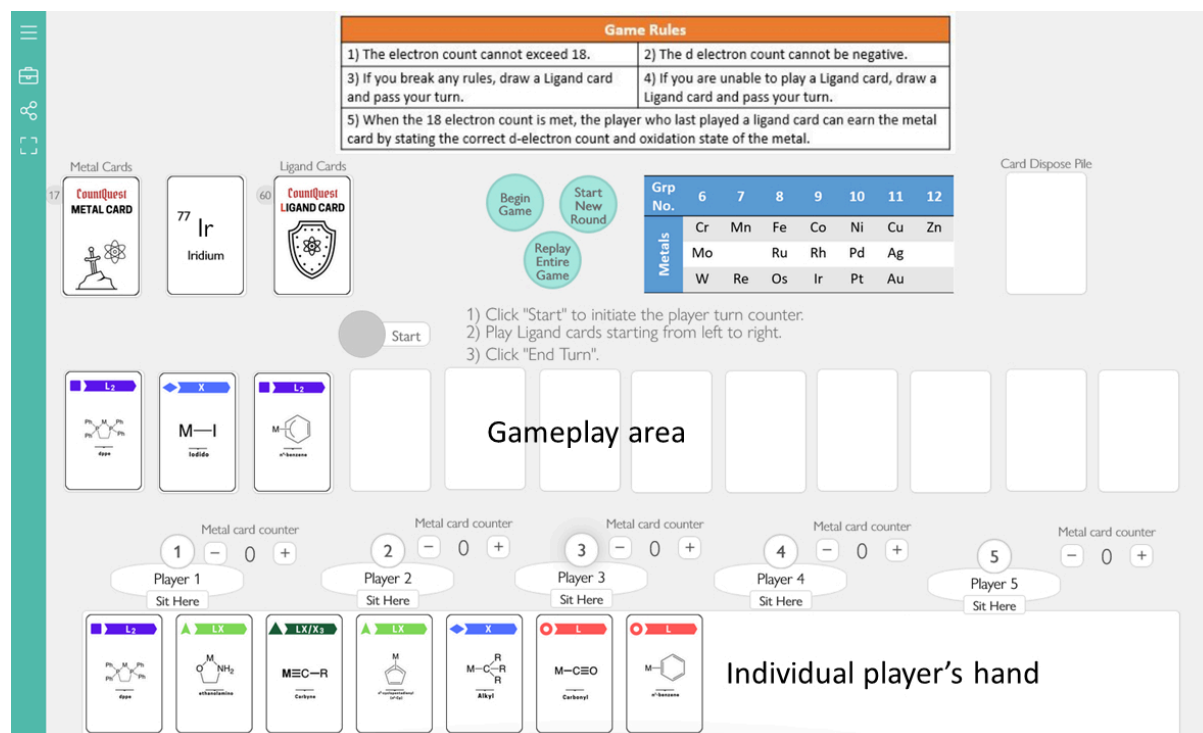
Figure 2: Customized playing table for CountQuest.
Note that the cards in the individual player's hand cannot be seen by other players.

Three levels of CountQuest were developed to scaffold students' learning on electron counting (Table 1). Customized Metal and Ligand cards decks were designed for each level.

Level	Purpose	Required electron count of complex	Ligand Cards
pre-level 1	Familiarize with game rules and refresh lecture on electron counting	18	Labelled
1	Appreciate not all metal complexes have 18 electrons and increase fun factor of the game	variable: 16-21	Labelled
2	Practice electron counting of ligands	18	Unlabelled

Table 1: The three levels of CountQuest played, along with the corresponding purpose, required electron count and the type of ligand cards used for each level.

Results and Discussion

To illuminate the research questions, a survey was administered to obtain student perceptions in the following areas:
  (i)   content mastery of electron counting
  (ii)   game design of CountQuest

   (iii)   CountQuest as a learning method
   (iv)   playability of CountQuest in a virtual tabletop setting

The results are shown in Tables 2 to 5.

No.	Question	(A+ SA)*% pre	(A+ SA)*% post
1	I had difficulties learning the concept of electron counting.	27.5	17.5
2	I can classify ligands according to the L and X convention.	60.0	77.5
3	I can state the oxidation state and d-configuration of the metal in the metal complex.	75.0	90.0
4	Overall, I am confident in electron counting for metal complexes.	32.5	72.5

Table 2: Pre-, post- game survey questions for content mastery (N=40). (A+ SA)% represents the percentage of respondents who rated agree (A) and strongly agree (SA).

From the pre- and post-game survey in Table 2, confidence in electron counting for metal complexes (Q4) has improved as the percentage of respondents agreeing and strongly agreeing more than doubled from 32.5% pre-game to 72.5% post-game (RQ1). This large increase in students' perception of their confidence in electron counting is very encouraging. In addition, the percentage of respondents agreeing and strongly agreeing to specific skills in electron counting such as classification of ligands, oxidation state and d-configuration of the metal also exhibited a marked increase post-game.

To determine whether playing CountQuest makes a difference in the quiz scores of students (RQ2), students took a pre- and post-game quiz. The pre- and post- game quiz consist of 5 questions with a total score of 15. The students were shown a different metal complex for each question and asked to write down its three key numerical attributes (electron count, oxidation state and d-electron count).

A paired sample t-test at 5% significance level was performed to evaluate whether there was a statistical difference between the score of the students in the pre-game quiz and the post-game quiz after playing CountQuest. The results indicated that the post-game quiz scores (M = 12.32, SD = 2.22) were significantly higher than the pre-game quiz scores (M = 14.12, SD = 1.41), $t(56) = 5.753$, $p = < .001$.

No.	Question	(A+ SA)*%
1	The instructions of the game were clearly defined.	87.5
2	The card game was easy to play with prior knowledge of the 18-electron rule.	89.6
3	The duration of the game was just nice	83.3
4	The number of players for the game is just nice	83.3
5	I enjoy playing the different levels of the game	89.6
6	The number of game levels is appropriate	91.7
7	The progression of the game level difficulty is suitable	93.7
8	I enjoy playing the game with the metal card conditions	91.7
9	The card game was fun.	93.7

Table 3: Survey questions for game design of CountQuest (N=48). (A+ SA)% represents the percentage of respondents agreeing and strongly agreeing.

For Table 3, regarding the game design of CountQuest, 89.6% respondents agreed and strongly agreed that the game was easy to play with prior knowledge of the 18-electron rule. In addition, respondents responded favorably to the number and different game levels of CountQuest. More importantly, 93.7% of respondents perceive CountQuest as fun (Q9). Fun has been identified to be pedagogically beneficial (Bisson & Luckner, 1996) as it enhances intrinsic motivation to learn and creates a safe learning environment.

No.	Question	(A+SA)*%
1	I prefer this method of learning compared to the conventional method.	60.4
2	This method of learning is more effective than the conventional method	60.4
3	This method of online learning is engaging.	85.4
4	Playing this game with my peers helps me to identify my misconceptions	83.3
5	I would recommend doing this card game session again for next year's CM2111 class	87.5
6	The different levels of the game reinforce my understanding of the relevant chemistry concepts	91.7

Table 4: CountQuest as learning method (N=48). (A+ SA)% represents the percentage of respondents agreeing and strongly agreeing.

On RQ3 about CountQuest as a learning method, only a slight majority (60.4%) preferred learning electron counting via CountQuest compared to the conventional method (i.e. lectures), with the same percentage saying that it is more effective (see Table 4, Q1 and 2). Interestingly, a large majority (85.4%) agreed and strongly agreed that "this method of online learning is engaging". This suggests that while students think CountQuest played on a virtual desktop is engaging, they are divided on whether it is an effective method for learning the concept compared to conventional method.

No.	Question	(A+SA)*%
1	It is easy to play the game on playingcards.io.	83.3
2	The layout of the virtual play area is clear.	81.2
3	I can play the game without a game master.	58.3
4	I prefer playing the game virtually than face-to-face with physical cards.	33.3

Table 5: Playability of CountQuest on virtual tabletop (N=48). (A+ SA)% represents the percentage of respondents agreeing and strongly agreeing.

For Table 5, regarding the playability of CountQuest on the playingcards.io virtual desktop (RQ4), more than 80% of the students agreed and strongly agreed that it was easy to play the game and the layout of the virtual play area is clear. This suggests that playingcards.io can be used for hosting educational card games and received favorably by students. However only one-third (33.3%) of the students preferred to play the online version of CountQuest than the face-to-face card game version. This is most probably due to the lack of social interactions between players playing an online game compared to a version which is face-to-face. As playingcards.io has limiting scripting ability, CountQuest was played with a game master (facilitator) for each group since the players need to be instructed on the rules and gameplay at the start. When asked whether CountQuest can be played without a game master, only a slight majority, 58.3% of respondents agreed. This indicates the presence of a game master is necessary for optimum gameplay for this version of CountQuest.

As CountQuest was played in CM2111 over three years with different modes of delivery, we compared the students' responses on selected questions regarding confidence in electron counting, peer help for identifying misconceptions and fun element of the game (Qn. A-C) in Table 6:

	2019	**2020**	**2021**
Mode of game delivery	physical face-to-face	online via Zoom annotate	online via playingcards.io (current work)
Qn. A (pre-game): Overall, I am confident in electron counting for metal complexes.	44.1	46.0	32.5
Qn. A (post-game): Overall, I am confident in electron counting for metal complexes.	86.1	81.0	72.5
Qn. B (post-game): Playing this game with my peers helps me to identify my misconceptions.	94.4	84.1	83.3
Qn. C(post-game): The card game was fun.	NA*	79.4	93.7

Table 6: Selected questions for CountQuest played with different modes of delivery for fall 2019 (N=72 for pre and post-game), 2020 (N=63 for pre and post-game), 2021 (N=40 for pre-game, N=48 post-game). Numbers represent the percentage of respondents agreeing and strongly agreeing. *Qn. C was not asked during 2019.

From Table 6, a marked increase in the students' perception of confidence for electron counting from pre- to post-game was seen in all three years showing that CountQuest was effective regardless of the mode of game delivery: physical or online. For Qn.B, a higher proportion of students perceived the physical version in 2019 to be more effective for peer help compared to the online versions played in 2020 and 2021. This suggests that peer learning is more effective in a physical face-to-face than in an online environment due to

increased social interaction. This finding is consistent with previous work in the literature which indicated that face-to-face mode of game-based learning is perceived more favorably than online on aspects such as overall effectiveness and fun element (López-Fernández et al., 2023). In addition, Qn.C indicated that students perceived the current online version of CountQuest mounted on playingcards.io (93.7%) as more fun than the online version via using Zoom annotate in 2020 (79.4%). This is most probably due to the smoother game mechanics/interface using a virtual tabletop compared to annotating on a shared screen in Zoom.

Conclusion

A web-based virtual tabletop, playingcards.io was used to mount an online version of an electron-counting card game, CountQuest developed at the National University of Singapore. Students from the module CM2111: Inorganic Chemistry 2 played this game for an hour in the fall of 2021 after lectures on electron counting. Pre- and post-game surveys demonstrated increased confidence in electron counting which is further corroborated with a statistically significant gain in post-game quiz scores. Comparison of different modes of delivery (physical, online) for CountQuest all indicate an increase in CM2111 students' confidence in electron counting after playing the game. These results are encouraging and demonstrate that appropriately designed tabletop games played physically or online can be used to revise classroom concepts with an increase in student confidence and learning.

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Exploring the Landscape of Gamification in Higher Education: A Systematic Mapping Study

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Abstract

The concept of gamification is attracting significant attention and implementation in several industries. However, its use in higher education is still in its early phases. The use of game design aspects in non-game situations, sometimes called gamification, has emerged as a prominent trend in boosting learning experiences. This systematic mapping study investigates the utilisation of gamification in non-game contexts, specifically within higher education. By analysing peer-reviewed articles published between 2018 and 2022, the study explores various aspects, including the application of gamification, the variables under investigation, the game design elements employed, and the platforms utilised for implementation. This study focuses on the examination of the academic implications of incorporating game design components. It aims to identify and analyse this field's current patterns and future directions. The findings indicate that gamification is widely seen within Computer Science/Information Technology and Business domains. Majorly analysed variables include motivation, academic performance, and engagement. The research also highlights the increased use of gamification in online courses throughout the pandemic, emphasising its potential to enhance remote education experiences. Notably, platforms like Kahoot! have regularly shown favourable results in this area. This study comprehensively examines the current state and possibilities of gamification in higher education environments.

Keywords: Gamification, Higher Education, Systematic Mapping

Introduction

In the past decade, the concept of gamification has emerged as a compelling approach across numerous domains (Hamari, Koivisto, & Sarsa, 2014). In the realm of education, gamification has become recognized as a technique that is used by institutions and educators to enhance learners' engagement, and motivation, and promote learning outcomes (Manzano-León et al., 2021). The increasing interest in using gamified approaches in education highlights its potential to revolutionize traditional pedagogical methods. This paper aims to explore the implementation of gamification within the dynamic landscape of higher education by embarking on an exploration of the existing body of research on the usage of gamification.

Definition of Gamification

Gamification has evolved as a potent approach in a variety of situations to affect human behaviour throughout the past decade. However, it is still a relatively contemporary idea (Hosseini, Humlung, Fagerstrøm, & Haddara, 2022). Initially appearing in the digital media industry in 2008, gamification has been rapidly incorporated into marketing, management, health and wellness, ecology initiatives, and education (Deterding, Dixon, Khaled, & Nacke, 2011). Even before 2008, the concept of gamification had existed for significantly longer than it was noticed. Moreover, it had been used in several instances as Kim et al. (2018) concluded: as an early attempt to increase client loyalty in a company, the Sperry & Hutchinson (S&H) stamp was a good example in business. In 1981, American Airlines (AA) implemented gamification into its operations to attract new clients and retain existing ones. Holiday Inn launched a comparable loyalty programme across the States after AA in 1983. Kim et al. (2018) also listed examples for educational purposes, such as The Oregon Trail and Lemonade Stand were created in the 1970s, Master Type, Rocky's Boots, SimCity, and so on in the 1980s.

In 1996, Richard Bartle (1996) developed a taxonomy based on investigating people who play multi-user dungeons (MUDs) and observing their social patterns. Bartle categorized participants into four groups based on their inclinations for acting or interacting and their interest in these games: socializers, explorers, achievers, and killers.

In 2002, game designer Nick Pelling was responsible for creating a game-like interface for ATMs and vending machines. He invented the Term "gamification" and labelled it as a "deliberately nasty word" since it was used to describe "using game-like accelerated user interface design to make electronic transactions both enjoyable and fast" (Burke, 2014). Since then, the term has taken on a broader meaning and is used primarily to motivate and engage people in a particular environment (Perryer, Celestine, Scott-Ladd, & Leighton, 2016).

In 2009, a gamified map application Foursquare was launched. The appearance of Foursquare was ground-breaking. It allowed players to collect badges by checking in one area, exploring new areas, or being a mayor of multiple places (Burke, 2014).

Although the term was invented much earlier than being widely accepted, it has been defined from many perspectives by researchers and academics throughout the years. According to Zichermann and Cunningham (2011), gamification is "the process of game-thinking and game mechanics to engage users and solve problems." While Kappa (2012) focused more on the design perspective and described gamification as "using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning and solve

problems." However, the multiple definitions of gamification all centre on the same principle, defined by Deterding et al. (2011) as the use of game design elements in non-game contexts. More specifically, gamification refers to the following:

- the use (rather than the extension) of
- design (rather than game-based technology or other game related practices)
- elements (rather than full-fledged games)
- characteristic for games (rather than play or playfulness)
- in non-game contexts (regardless of specific usage intentions, contexts, or media of implementation).

Deterding et al. (2011) categorized game design elements into different levels of abstraction. Five levels from concrete: 1) Interface design patterns, 2) game design patterns or game mechanics, design principles, heuristics or 'lenses', 3) conceptual models of game design units, 4) game design methods, and 5) design processes.

Game Design Elements

As previously mentioned, Deterding et al. (2011) divided game design elements into five categories, but not everyone agreed. Dicheva et al. (2015) took the game design element "badges" as an example, stating that it has been used as a game interface design pattern in Deterding's categorization, a game mechanic (Zichermann & Cunningham, 2011), and a game component (Werbach & Hunter, 2012), and a game dynamic (Iosup & Epema, 2014), and a motivational affordance (Hamari, Koivisto, & Sarsa, 2014). Dicheva et al. (2015) classified "badges" into gamification design principles instead of simply using game design principles to distinguish gamification and game.

In general, game design elements are defined into multiple levels of abstraction. There are several widely accepted game design element classifications. Zichermann and Cunningham (2011) categorized game design elements into mechanics, dynamics, and aesthetics (MDA). Werbach & Hunter (2012) classified them into Dynamics, Mechanics, and Components (DMC), which correspond to the first two components of Zichermann and Cunningham's framework and gamification design principles by Dicheva et al. (2015).

Gamification in Education

Gamification aids learning (Kim, Song, Lockee, & Burton, 2018). In education, gamification has increased prompting further research on this topic (Furdu, Tomozei, & Kose, 2017). Kim et al.(2018) defined gamification as "A set of activities and processes", "To solve problems related to learning in education", and "By using or applying the game mechanics". Gamification is becoming more popular in academia (Alhammad & Moreno, 2018).

Borges et al. (2014) conducted a systematic mapping in education to generate an overview and identified computer-supported collaborative learning initiatives that employ gamification. The authors found that higher education uses gamification the most. They also summarised primary studies by research objective and identified that most of the studies were aimed at students. They also categorised other objectives, including improving learning, mastering skills, behavioural change, socialization, and challenging. In the end, they discovered that there is a dearth of methods that integrate gamification with computer-supported collaborative learning.

Caponetto et al. (2014) examined 119 papers published from 2011 to 2014. Over half of these papers were in primary school and higher education. A cloud-generated diagram showed motivation and engagement were the most frequently used words from the paper abstracts. The authors also noted considerable ambiguity surrounding the terms gamification and game-based learning. Most papers consistently use the term gamification as the "use of game mechanics in non-gaming contexts" (Deterding et al., 2011). Lastly, gamification has been used in a wide range of subjects such as science, maths, foreign languages, health and software engineering, and transversal attitudes and behaviours such as peer collaboration, creativity, and self-guided learning.

Dicheva et al. (2015) mapped educational contexts where gamification and game elements have been used. First, visual status, social engagement, freedom of choice, freedom to fail, and rapid feedback are the most common educational gamification design elements. Points, badges, and leaderboards are the most popular game mechanisms. Further, computer science and information technology is the most dominant area/subject that uses gamification. Among four other categories, including courses without online gamification support, MOOCS or online courses, E-learning sites, and gamification support platforms, blended learning courses are the most used for higher education. Dicheva et al. (2015) divided gamification into four categories: 1) manual implementation on student performance, implementation as a plug-in or extension for a learning management system or online learning environment, 3) third-party software, or 4) standalone application. They reported that a plug-in or extension is mostly used.

In the most recent year, several review papers from different aspects were published. Hamari et al. (2018) examined 128 studies to identify how it was implemented, the expected outcomes, and the results. Social-oriented, immersion-oriented affordances are seldom applied in education. The most common psychological outcomes are the user experiences and perceptions of the system and features, while the most common behavioural outcomes are grades, participation in a system, and speed of conducting tasks and assignments. Finally, they advised adopting gamification with greater social and immersion-oriented affordances in an educational context.

Manzano-León et al. (2021) revealed that university education increased across education levels in 14 quantitative experimental research. Academic achievement, engagement, and motivation was highly investigated. They also found that most studies report positive results of using gamification. Saleem et al.(2022) focused on online education, addressing the purposes of using gamification, challenges for both students and teachers and elements that enhance students' motivation and engagement. Gamification in online education aims to increase specific skills, discover goals that promote learning, engage students, maximise learning, and encourage attitude change. Gamification can be useful for teachers acquiring knowledge and enhancing vital skills such as decision-making, cooperation, and communication, and an additional technique to make the learning process entertaining, interactive, and useful. Additionally, Saleem et al. indicated challenges such as technology infrastructure, Internet service, and the willingness to use this tool.

Most gamification research examined how gamification positively influenced academic promotion (Fuster-Guillo et al., 2019; Ng & Lo, 2022; Sailer & Sailer, 2021; van Roy, Deterding, & Zaman, 2019), motivation and engagement (Ghawail & Yahia, 2022; Ortega-Arranz et al., 2019; Rincon-Flores & Santos-Guevara, 2021; Song, Shi, Wang, & Xu, 2018). Since digital technology has become more affordable and prevalent, it is easier to employ

gamification (Zainuddin, Chu, Shujahat, & Perera, 2020). Few scholars focused on technology adoption or combined technology acceptance to examine students' motivation. Ab Rahman et al. (2018) identified the correlations between gamification technology, students' attitudes toward using gamification, and students' engagement based on a modified TAM in IT subjects. Chen and Zhao (2022) integrated the self-determination theory and TAM to identify the impact of motivation on gamification technology acceptance in foreign language education.

Design of the Systematic Mapping

A systematic mapping design is employed in this study. A systematic mapping study is comparable to a systematic review, with the exception that it categorises the sort of research reports and results that have been published and frequently provides a visual summary of its findings, the map (Petersen, Feldt, Mujtaba, & Mattsson, 2008). The essential process steps of carrying out a systematic mapping study (Petersen, Feldt, Mujtaba, & Mattsson, 2008), including a definition of research questions, conducting a search, screening of papers, keywording of an abstract, and data extraction and mapping are followed.

Research Questions

This study attempts to provide an overview of existing research on gamification in higher education. The main objective is specified by five research questions:
  RQ1: What subject areas are gamification implemented in higher education?
  RQ2: Which variables have received the most attention in the realm of higher education gamification studies?
  RQ3: What game design elements have been applied in the higher educational context?
  RQ4: What platforms/tools are used to implement gamification in higher education?
  RQ5: What are the results reported in the studies?

Searching Criterion

The search in this study was limited to 1) experimental studies that discuss explicitly the use of game elements in higher education. Theoretical or reflective papers were excluded; 2) published in peer-reviewed journals, and full articles are accessible; 3) Published in English between 2018 to 2022; 4) Studies that focus on game-based learning, serious games, simulation, virtual reality, smart learning, or distance learning without game elements were excluded. Non-accessible articles, books or book chapters, review articles, conceptual papers. Editorials and conference proceedings were excluded.

Two major electronic databases Web of Science and Science of Direct were used to search a combination of the following keywords: Gamification AND ("higher education" OR university OR "tertiary education" OR college). Initially, 1231 primary papers from Web of Science, and 698 from Science of Direct were retrieved. Only 7 duplicates were removed after exporting all searched records to the RefWorks platform. Based on the abstracts, all publications that did not meet the inclusion criteria were removed. A second round of filtering was based on full text, although some studies were conducted in higher education, the publications are not explicitly related to students' learning, such as career development, awareness of sustainability, and library searching skills., etc were excluded. A total of 54 full-text articles that met the criteria were thoroughly examined.

Findings

RQ1 Subject Areas

RQ1 addresses the subject domain where gamification is applied in higher education. As Figure 1. illustrates, most studies among 54 selected articles applied gamification in Computer Science/Information Technology (CS/IT) and Business/Marketing/Management in higher education. Followed by Education, Medical/Health/Nurse, and Language learning. The rest 6 articles applied gamification in multiple disciplines, instead of focusing on any specific subject.
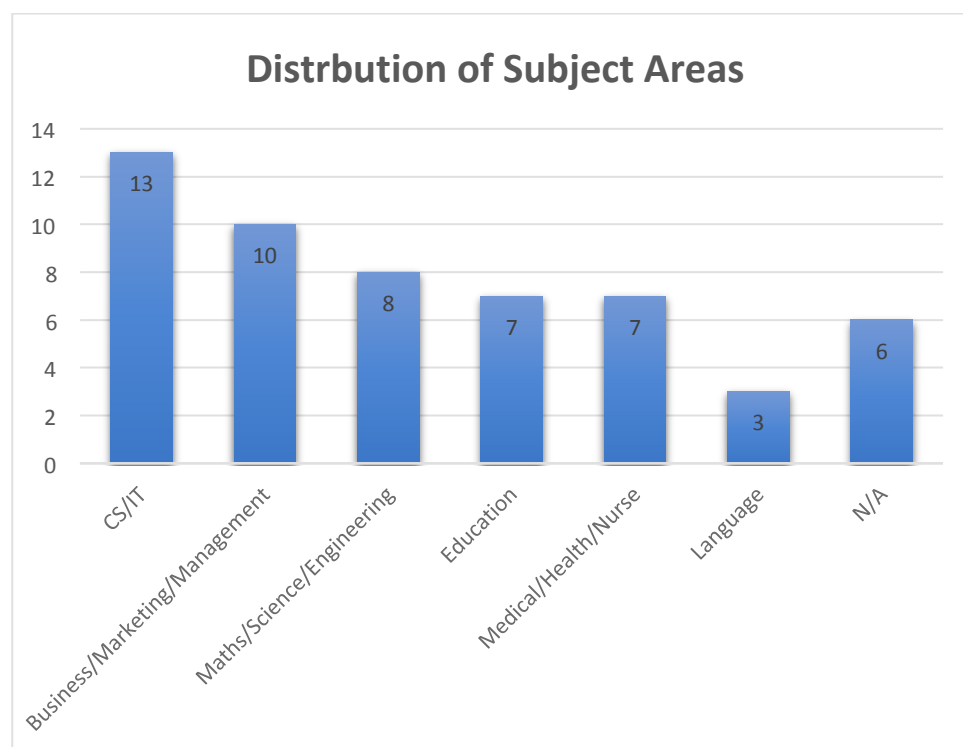
Figure 1: Distribution of Subject Areas

RQ2 Analysed Variables

RQ2 aims to identify the variables that have been frequently analysed in higher education. Motivation, academic performance/grades, engagement, class attendance/participation, and learning outcomes are five variables that have attracted the most attention among the selected studies. Figure 2. shows the distribution of studies by the analysed variables. Apart from these top 5 variables, satisfaction, attitude toward learning, and technology acceptance also have been analysed in these studies.
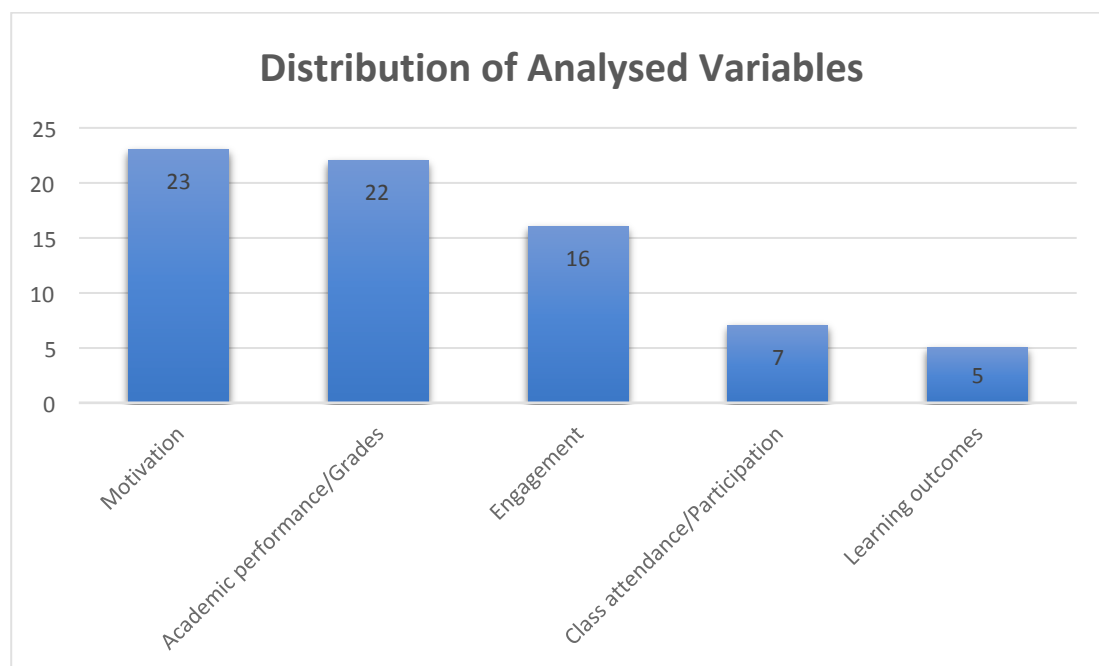
Figure 2: Distribution of Analysed Variables

RQ3 Game Design Elements

Although game design elements were distinguished by Deterding et al. (2011) into interface design patterns, game design patterns or game mechanics, design principles, heuristics or 'lenses', conceptual models of game design units, game design methods, and design processes, game design elements are not grouped in a way that everyone agrees on. Dicheva et al. (2015) took the game design element "badges" as an example and indicated that it has been used as a game interface design pattern in Deterding's categorization, a game mechanic (Zichermann & Cunningham, 2011), and a game component in (Werbach & Hunter, 2012), and a game dynamic in (Iosup & Epema, 2014), a motivational affordance in (Hamari, Koivisto, & Sarsa, 2014). Dicheva et al. (2015) classified "badges" into gamification design principles instead of simply using game design principles to distinguish gamification and games.

In general, game design elements are defined and categorized into several levels of abstraction. There are several widely accepted game design element classifications. For example, they are categorized into mechanics, dynamics, and aesthetics (MDA) by Zichermann and Cunningham (2011), classified into DMC (Dynamics, Mechanics, and Components) by Werbach & Hunter (2012), and grouped into game mechanics which correspond to the first two components of Zichermann and Cunningham's framework, and gamification design principles by Dicheva et al. (2015). In this research, Werbach & Hunter's DMC framework is selected to identify game design elements in the higher education context. All design elements covered by the DMC framework are recorded in this research. Fig 3. shows the distribution by dynamics, mechanics, and components. As a result, challenges, competition, and feedback are the top three mechanics that have been applied in higher education, and points, leaderboards, badges are the most popular components used in various subjects.
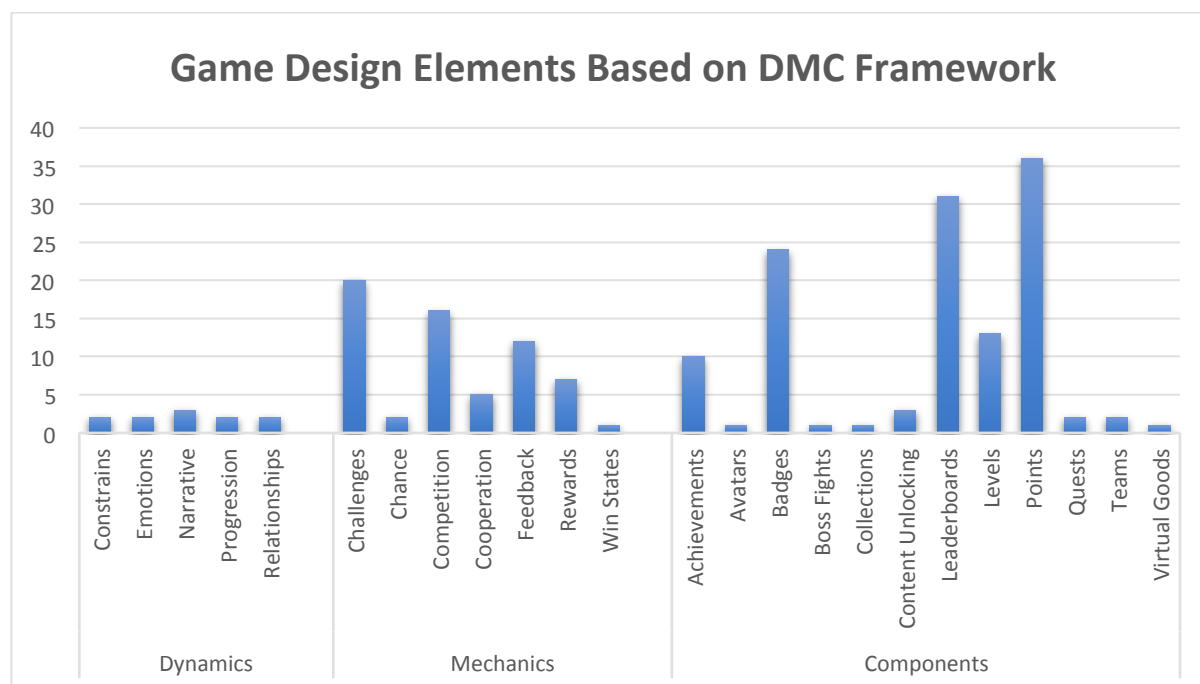
Figure 3: Game Design Elements

RQ4 Type of Implementation

This research question seeks to identify the platforms or tools created or utilised to employ gamification in higher education. The study of the selected papers resulted in four categories: An existing third-party gamification support platform including software, mobile application, and website application was used. In this category, 28 papers utilised an existing gamification platform. The most prevalent platform report in this study is Kahoot! 14 papers among them used Kahoot! which was employed either as an only gamification platform or integrated with other gamification platforms. For example, Leon & Pena used Mentimeter, Socrative, and Kahoot! to design and present subject content, assessment, and learning complexity in a dynamic, entertaining, and active way (2022). Apart from Kahoot!, other existing gamification platforms were reported. Examples include Classcraft (Ferriz-Valero, Osterlie, Martinez, & Garcia-Jaen, 2020), Horses for Courses (Legaki, Xi, Hamari, Karpouzis, & Assimakopoulos, 2020), Ace Your Self-Study (Baars, Khare, & Ridderstap, 2022), BioVL (Caño de las Heras et al., 2021), Khan Academy and Codecademy (van Roy, Deterding, & Zaman, 2019), Heureka (Sobrino-Duque et al., 2022), Q-Learning-G (Ibanez, Di-Serio, & Delgado-Kloos, 2014), QueryCompetition (Morales-Trujillo & Garcia-Mireles, 2021), G-SIDRA (Lopez-Jimenez et al., 2022), Rain Class and FIF Speaking (Chen, Zhang, & Yin, 2022).

A new gamification platform was developed. This comprises research that created a brand-new independent platform, either a mobile application or an online application that incorporates game design principles and gamification elements. BeHere (Pinter, Cisar, Balogh, & Manojlovic, 2020), ePS (Ngan, Tang, Chan, Chen, & Tang, 2018), and 2TSW (Polito & Temperini, 2021).

A gamification plug-in/extension to an existing online education system or a non-gamified platform was used in the university. For example, X points (Jusas, Barisas, & Janciukas, 2022) and Level UP (Bai, Hew, Gonda, Huang, & Liang, 2022) were plugged into the online learning system. Badgr tool was implemented on Massive Open Online Courses (MOOC)

(Ortega-Arranz et al., 2019), and the Question Board Platform was plugged into an online learning portal (Bouchrika, Harrati, Wanick, & Wills, 2021). Moodle is the most widely used online learning education system and gamification applications were added to it (Ahmed & Asiksoy, 2021; Bovermann, Weidlich, & Bastiaens, 2018; Garcia-Iruela & Hijon-Neira, 2020; Garcia-Iruela, Fonseca, Hijon-Neira, & Chambel, 2020; Ng & Lo, 2022; Tsay, Kofinas, & Luo, 2018).

No special gamification platform was used. This category includes research that employs gamification without using a gamification platform or extending a non-gamified tool. For example, a picture, stamp, or other evidence was sent through the What's App Group Chat when participation or assistance in institutional events and teamwork challenges were confirmed (Diaz-Ramirez, 2020).

Figure. 4 illustrates the distribution of the studies by the type of implementation. More than half of the papers use existing gamification platforms in higher education, and plug-in or extension to existing online education/non-gamified platforms is also commonly utilised.
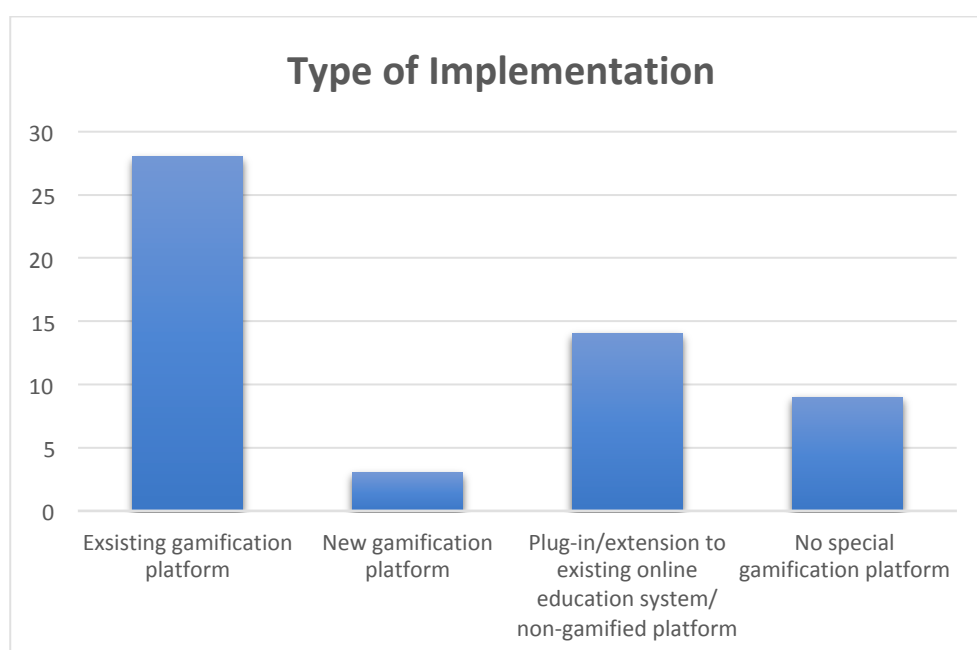
Figure 4: Type of Implementation

RQ5 Reported Results

Figure. 5 displays the distribution of the selected papers based on the type of reported results, which are classified into four categories: positive, negative, no significant difference, and mixed results.
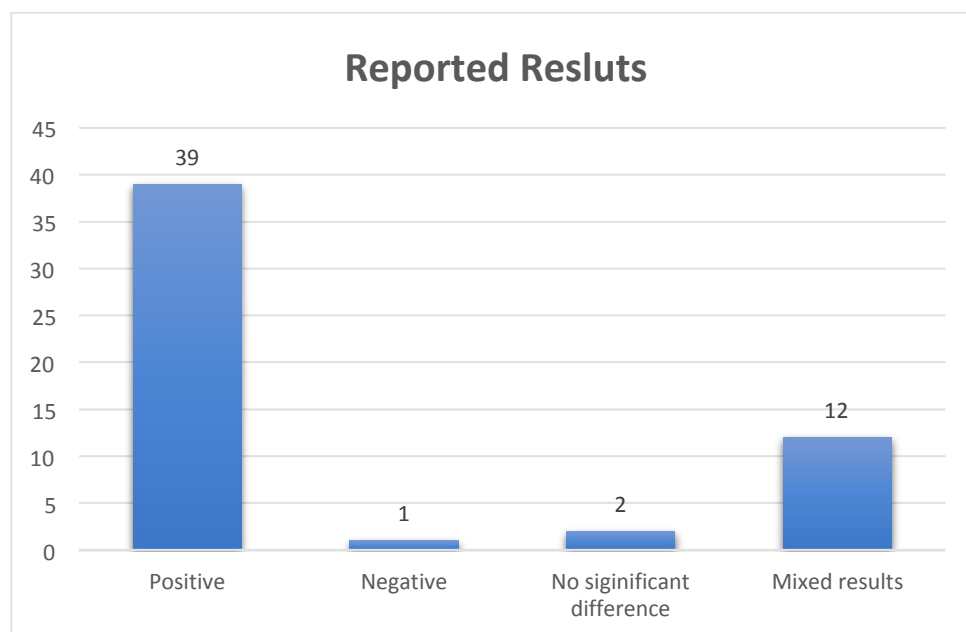
Reported Resluts

Figure 5: Reported Results

Discussion and Conclusions

This systematic review examined 54 articles from 17 countries. The findings identified gamification applied subject areas in the context of higher education, and focused on analysed variables, gamification design elements, the implementation, and reported positive and negative aspects of gamification.

In this study, it was found that gamification most applied study area in higher education in Computer Science/Information Technology. Although gamification has been more commonly adapted to various disciplines in the higher education sector, CS/IT has become the most dominant study area that applies gamification. Dicheva et al. (2015) explained the reason was that many teachers lack the necessary skills and time to create, develop, and/or maintain a sufficient supportive technological infrastructure, the early application of gamification to learning occurred mostly in CS/IT fields. And this seems not been significantly changed based on the results found in this study. Although learning management systems (LMS) such as Blackboard, and Moodle and Virtual classroom technologies for synchronous teaching platforms such as Blackboard Collaborate, Teams, and Zoom have been widely used in higher education as technological support in recent years, the adoption of applying gamification in other disciplines is still limited.

This study also concludes that motivation, academic performance, and engagement are the most analysed variables, followed by class attendance, learning outcomes, satisfaction, attitude toward learning, and other cognitive variables. Most selected articles reported that motivation, as the most studied variable, can be promoted by applying gamification. Only Ferriz-Valero et al. (2020) found that students' intrinsic motivation does not change in their studies. It's interesting to notice that the majority of these studies made use of leaderboards, points/scores, or/and badges, which is why extrinsic motivation was fostered, with students executing tasks to get the points, scores, or/and badges.

Furthermore, engagement as another key component of successful learning in education is studied and discussed with motivation on most occasions. Students who reported high

motivation by badges at the end of the course demonstrated higher levels of engagement than those who were not motivated by badges (Ortega-Arranz et al., 2019). Meanwhile, the results are not always consistent when motivation is studied with another frequently analysed variable, academic performance. Both motivation and academic performance are improved in the study (Fuster-Guillo et al., 2019; Morales-Trujillo & Garcia-Mireles, 2021). However, intrinsic motivation does not change when academic performance is benefited (Ferriz-Valero, Osterlie, Martinez, & Garcia-Jaen, 2020). In addition, the group less involved in the gamification received better academic results, although motivation was improved in the subject (Hernandez-Fernandez, Olmedo-Torre, & Pena, 2020). It is reasonable to assume that when students have an assessment that they deem important surrounded by a pleasant atmosphere, they will be more motivated to complete the assessment. It would also be worthwhile to examine the impact of gamification on the modification of undesirable student behaviours, such as classroom disruption and absenteeism.

Interestingly, 14 papers used Kahoot! as an online gamification platform in higher education, and all reported results are positive. Ismal et al. (2019) used Kahoot! as a formative assessment tool in medical education and identify that Kahoot! is an attractive learning tool, a source of motivation, and learning guidance in the study. Likewise, Felszeghy et al. (2019) employed Kahoot! in histology teaching and reported that students are more enjoyable studying in a more relaxed atmosphere for discussions and are less reluctant to learn the lessons. At the same time, Kahoot! enables students to obtain just-in-time feedback and engage with instructors and peers. Apart from students' motivation, Campillo-Ferrer et al. (2020) also identified the impact on the acquisition of social and civic competencies. Kahoot! enable students to absorb knowledge in a novel manner and create a set of social and civic competence-related skills and talents. Kahoot! as an online gamification platform helps students to improve academic performance in business management subjects (Martinez-Jimenez, Pedrosa-Ortega, Liceran-Gutierrez, Ruiz-Jimenez, & Garcia-Marti, 2021; Ortiz-Martinez, Santos-Jaen, & Palacios-Manzano, 2022) and computer engineering degrees (Fuster-Guillo et al., 2019). As the empirical studies approved, Kahoot! as an application of gamification platform in the context of higher education has generated an environment for students learning to enhance various aspects, such as motivation, participation, engagement, formative assessment results, classroom dynamics, and peer interaction.

It is noticeable that all studies used online support even those studies which did not use a special gamification platform. Based on the review results, during the pandemic, gamification elements have been more frequently applied in online courses or online and face-to-face mixed courses. Students had to attend online classes and spent 6-8 hours per day on online learning in the past several years during the pandemic. Apart from the above-mentioned benefits of applying gamification, it also helps students reduce online fatigue and stress during the pandemic (Ropero-Padilla et al., 2021). To some extent, Covid-19 has not only drastically changed human life, but also significantly changed education patterns (Yang & Lee, 2021). It has compelled universities to be more innovative, adaptable, and agile in the teaching transition to online or blended learning (Ropero-Padilla et al., 2021).

Finally, it is crucial to note that gamification in the context of higher education needs to be implemented properly. Instructors need to consider the correct ways to integrate gamification into the learning process (Wirani, Nabarian, & Romadhon, 2022). It must be content-related or well-planned (Felszeghy et al., 2019; Ismal et al., 2019). Good preparation can avoid causing confusion and stress for both instructors and students. For example, instructors need

to know the conditions of the facilities and infrastructure when gamification is applied, such as the availability of the internet, mobile devices, or laptops.

While this systematic literature mapping has provided insights into the landscape of gamification in higher education, it is imperative to acknowledge certain limitations inherent in the study. One noteworthy limitation pertains to the source of articles. Despite the meticulous inclusion of all papers meeting the predefined criteria, the potential for oversight remains due to inaccessible full texts or constraints imposed by the selected database.

Furthermore, a notable challenge arises from the amalgamation of gamification with other closely related terminologies, such as game-based learning, serious games, and simulation, among others. The interchangeability of these terms in existing literature poses a potential obstacle to the exhaustive identification of relevant studies during the mapping process. This intrinsic complexity underscores the need for a nuanced approach in future research endeavours.

Moving forward, future investigations need to focus on both educators' and students' adoption and acceptance of gamification to comprehensively understand the implementation of gamification in higher education. To achieve this, both qualitative and quantitative studies should be conducted in specific study areas. Additionally, comparative studies across diverse student groups, considering variables such as gender, cultural background, and study programs, are crucial for discerning the intricate ways in which external factors influence students' gamification adoption process.

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Reflection on My Interactions With Student J Within the Framework of Motivational Interviewing

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Abstract

Current pedagogies for supporting academically struggling students mainly include tailoring learning contents to meet their differentiated needs or offering one-on-one interventions to improve their self-management. However, using counseling approach to elicit behavioral change has not been explored much. This case study analyzes my three conversations with an academically struggling student in a rural primary school English class in southwest China within the framework of Motivational Interviewing (MI). The goal is to evoke a behavioral change in the student and help him become more engaged in class. I had been teaching this student named J since Fall 2021. His initial disturbing behaviors (e.g., making noises, sprinkling ink over his desk) in class revealed that he might lack the confidence in learning English, so our interactions focused on making him realize his capacity of learning well and obtaining a sense of achievement through continuous effort. Through MI-embedded conversations, J became less disruptive and more engaged in class. He also became more accepted by his peers and perceived himself more positively. I applied MI strategies of Open-ended Questions, Affirmations, Reflective Listening and Summaries in interacting with J. After each conversation, I reflected on the stages of change that J went through, including his ambivalence and change/sustain talk. Finally, I evaluated my interaction with J centering around MI spirits: partnership, evocation, acceptance and compassion. I concluded about the three factors in cultivating a trustful partnership with an academically struggling student: acceptance, sustained attention and forward-looking approach (shift focus from past frustration to future possibilities).

Keywords: Motivational Interviewing, Primary School Education, Stages of Change

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Introduction to Motivational Interviewing

This paper introduces Motivational Interviewing (MI), a counseling approach, and examines its potential application in evoking preferred behavioral change in educational settings by implementing a case study on an academically struggling student. According to Rollnick and Miller (1995), "Motivational Interviewing is a directive, client-centered counseling style for eliciting behavior change by helping clients to explore and resolve ambivalence" (p. 326). In other words, the core of the MI framework stresses gaining insights into clients' internal drives and values to guide them through ambivalence to enact behavioral change. This paper provides an overview of MI-related concepts and a case study on how MI techniques might be effectively used with a primary-aged struggling student.

MI Spirits in Classroom Relationship Building

The defining characteristic of MI is a set of essential concepts collectively referred to as MI spirits: partnership, acceptance, compassion, and evocation (Csillik, 2015). These can also be applied to teacher-student interactions in the education context. To establish rapport and a constructive partnership, teachers consider students in need as experts in their prior experiences and set a tone of mutual respect that permeates the entire community. They also believe in the students' "capacity to develop in a positive direction" and actively convey that belief to the students (Csillik, 2015). Acceptance is about recognizing students' "absolute worth and potential" as human beings and expressing "accurate empathy" to reinforce positive efforts (Csillik, 2015). Compassion is demonstrated by regarding students in need as equal and competent individuals who can shoulder "the primary responsibility for changing behavior" and bear the consequences (Csillik, 2015). Evocation can be an inspiration in teachers' work with academically struggling students, in which teachers "roll with resistance" instead of explicitly arguing for a change in their lives (Resnicow & McMaster, 2012).

A Case Study on J Within the Framework of MI

Methodology

This study was to examine the effectiveness of MI with a primary school student in rural China. A qualitative approach was adopted to allow a descriptive, exploratory, and detailed case study on behavioral interventions of the student.

Participant

J was a 9-year-old naughty and outgoing boy in third grade at the time of this study. Before the intervention, I had noticed some of J's behaviors, such as making weird noises in class or sprinkling ink all over his desk. J's parents got divorced when J was 2 years old and left their hometown for low-skilled jobs in cities. Being left at home, J suffered from emotional neglect and loneliness.

MI Intervention

All individuals considering change go through the 5 Stages of Change: Precontemplation, Contemplation, Preparation, Action, and Maintenance (Connors et al., 2013). J was first assessed about his Stage of Change. After that, MI strategies of Open-ended Questions,

Affirmations, Reflective Listening, and Summaries (OARS) were applied in the conversations with J to facilitate his growth and elicit his change talk.

Excerpts of MI-Embedded Conversations and Corresponding Analysis

Conversation #1: Background

In my third-grade English class, J diverted other students' attention frequently and never took out his textbook. At first I was surprised and annoyed, yet he refused to apologize and did not realize his misbehavior. We remained in confrontation in the first three weeks. In this period, I actively sought information about J's family background. After knowing his prior experience, I felt his misbehavior more understandable and I decided to give him more patience and attention. In my fourth week of teaching J, he asked me to give him up and neglect him in all future English classes. I refused and told him I would never give him up. He was surprised and gave me a collage as a gift. Then we had a conversation.

Conversation #1: Body

I: " I know you are frustrated by your past learning experiences, but English is a fresh start for you. I want to help you get rid of that frustration and gain confidence. What do you think of it?"
J:"I want to get rid of that frustration. It makes me feel I can do nothing well. But I am not sure how to catch up."
I:"It's nice of you to have the intention to catch up. How about starting from concentrating on my lecture in class? It may be hard to remain focused at first, but we can work on it together."
J: "That's a reasonable starting point. But I get distracted easily."
I: "Why would you become distracted easily?"
J: "Because when I could not understand the materials, I would feel bored and start to do other stuff."
I: "That's a fair observation. What do you think you can do to keep focused in class for, say, 15 minutes?"
J： "I can remind myself to listen in class. 15 minutes should not be too big a challenge for me."
I: "You are doing a good job getting out of your comfort zone and taking the challenge. How about after-class? What might you do to catch up?"
J: "May I come here to finish my homework and review the materials in textbook? But it's hard for me to do so everyday. What if I just play and forget to come?"
I: "I fully understand your concerns about distributing time between studying and playing. I could kindly remind you every afternoon. What else are you concerned?"
J: "I guess that's all I have for now. Please remember to call me in. "
I: "No problem! I am glad to see you thinking over catching up with classmates and figuring out an action plan!"

Conversation #1: Analysis

J's Stage of Change	J's Sustain/Change Talk	OARS Skills Used by the Teacher
Contemplation	"I want to get rid of that frustration. It makes me feel I can do nothing well."	Affirmation: "It's nice of you to have the intention to catch up." Open-ended question: "Why would you become distracted easily?"
Preparation	"I can remind myself to listen in class. 15 minutes should not be too big a challenge for me."	Open-ended question: "What might you do to catch up?" Affirmation: "You are doing a good job getting out of your comfort zone and taking the challenge."
Action	"Please remember to call me in."	Reflective listening: "I fully understand your concerns about distributing time between studying and playing." Affirmation: "I am glad to see you thinking over catching up with classmates and figuring out an action plan!"

Table 1. Analysis of conversation #1

J's intention to change surfaced when I communicated with him about regaining confidence and getting rid of frustration: he was unsatisfied with his past academic performance and wanted to catch up, yet he was unsure how to do it. My invitation to lengthen his focusing time in class and catch up after class ignited his interests, and J decided to move forward and take the initiative to change. Entering the preparation stage, J faced an ambivalence: he wanted to remain engaged in learning, yet he worried that he might not devote as much time to study as to play. With my support, J was assured and determined to take concrete actions to facilitate his academic progress and personal growth.

Conversation #2: Background

Rising from his previous fear of academic failure, J had worked hard on learning English towards the end of the semester. He reacted to my instructions actively and prepared for the final exam. Then somehow, he demonstrated disturbing behaviors and procrastinated on homework. He no longer seemed passionate about seeking my assistance in finishing English homework and reviewing materials covered in class. Having observed these, I had a conversation with J.

Conversation #2: Body

I: "J, you have made great progress in staying focused in class. You've also been persistently completing homework and reviewing knowledge points."
J nodded slightly and smiled in silence.
I: "Just curious, I noticed that recently you did not come to me often for homework support as you previously did, and you seemed a bit absent-minded in class. How do you feel about these?"
J: "I am not confident about my ability to do well in the final exam. You know, I always mess up in the finals. Why don't I give up if it is always the same poor results? It's easier."
I: "Your past unpleasant experience with final exams makes you doubtful about your efforts."
J: "Exactly."
I: "How did you feel when you gave up on yourself in learning in the past?"
J: "I felt helpless because I couldn't do anything well. I vaguely felt there was something wrong, but I could not tell exactly what it was."
I: "How did you feel when you accomplished something?"
J: "I was fulfilled because I made it. I could achieve something."
I: "What do you think makes the results different?"
J: "Before, I did not put much effort into learning and did not perform well academically. However, I made progress last time by listening and participating in class."
I: "You are saying that classroom engagement plays an important role in your academic success."
J: "Yes, I think so."
I: "How would you describe the state of being engaged in the classroom?"
J: "Like, follow the instructions in class, understand the learning points in the textbook, and take part in classroom activities."
I: "Great! And what do you plan to do to get closer to the engagement level?"
J: "Take out my textbook for each class and interact more in class. Maybe also finish the homework on time."
I: "Awesome. So, you see, you know clearly what you can do to improve your academic performance. What will you do next?"
J: "OK. I'll put more effort into learning English and give it a try for the final exam. I want to prove that I can achieve something. Please kindly remind me to come to your office to finish homework and other stuff in case I forget, will you?"
I: "Sure. I am glad to hear that. I believe your efforts will be rewarded!"

Conversation #2: Analysis

J's Stage of Change	J's Sustain/Change Talk	OARS Skills Used by the Teacher
Precontemplation	"Why don't I give up if it is always the same poor results? It's easier."	Affirmation: "J, you have made great progress in staying focused in class. You've also been persistently completing homework and reviewing knowledge points." Open-ended question: "How do you feel about these?" Reflective listening: "Your past unpleasant experience with final exams makes you doubtful about your efforts."
Contemplation	"I vaguely felt there was something wrong, but I could not tell exactly what it was." "I made progress last time by listening and participating in class."	Open-ended question: "How did you feel when you gave up on yourself in learning in the past?" Reflective listening: "You are saying that classroom engagement plays an important role in your academic success."
Preparation	"I'll put more effort into learning English and give it a try for the final exam."	Affirmation: "You know clearly what you can do to improve your academic performance."
Action	"Please kindly remind me to come to your office to finish homework and other stuff in case I forget, will you?"	Affirmation: " I believe your efforts will be rewarded!"

Table 2. Analysis of conversation #2

At the Precontemplation stage, ambivalence emerged in our conversation: J worried that his hard work would not pay off in the upcoming exam, and he was not sure whether to continue his efforts. I noticed his internal conflict and helped him move forward envisioning his future success instead of focusing on his past frustration. My use of OARS skills in my conversation with J helped him move beyond the Precontemplation stage and start to consider and prepare an action plan to better engage in the class. Through MI-embedded conversations, J was able to focus longer, maintain better posture, and engage more actively in classroom activities. He was gradually accepted by his peers, gained more confidence through learning, and perceived himself more positively.

Conclusion

This paper offers a brief overview of MI-related concepts and discusses MI's potential for application to education with a case study. These demonstrate the universal applicability of MI as a non-confrontational means of inducing client-led changes to resolve internal conflicts of interest under the directional guidance of MI practitioners. The MI approach's flexibility in adapting to different educational settings has earned it promising prospects in creating smoother schooling experiences for struggling students.

When MI is applied to teacher-student interactions in rural settings, some noteworthy points emerge. The main objective of subject teachers is to improve students' academic performance. Yet there are many underlying factors, such as psychological well-being, classroom participation, and peer relations, that may affect students' academic achievements. Being attentive to broader aspects of students' development and taking a holistic approach to students' education in rural China can be challenging. However, it is worthy of trying because an educator is not only there to teach, but also to coach, to mentor, to nurture, and to inspire.

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Digital Media, Teaching and Learning:
Pedagogical Implications for Teaching and Learning in a Participatory Culture

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Abstract

The era of digital media has come to create a youthful and pervasive participatory culture featuring different forms of affiliation, expression, problem-solving and information circulation among its members. The generation of digital media savvy individuals has now populated classrooms all over our college and university campuses. Concomitant with their arrival to the campus are the inevitable challenges for educators to instruct effectively members of this newly created powerful participatory culture. From the perspective of intercultural communication and based on research in cultural adaptation and teaching innovation, this paper examines (1) salient features of the current participatory culture; (2) primary characteristics of the digital media generation; (3) major components of cultural competence for educators teaching this digital media generation; and (4) specific relevant and applicable pedagogical strategies for educators to enhance their teaching effectiveness and students' learning outcome in their classrooms. Impact of participatory culture on teaching effectiveness is further analyzed and implications for educators' adaptation and teaching innovation are also explored and discussed.

Keywords: Digital Media, Education, Teaching and Learning

Introduction: The World of Digital Media

The world we live in today has quickly turned from a global village (McLuhan, 1960) to a networked society owing primarily to the development of information and communication technology (ICT). Social network sites such as Facebook, microblogging services such as Twitter, and content-sharing platforms such as YouTube have advance us all into a digital world full of opportunities for wide-scale, online social participation and media content creation and consumption.

Within education, particularly in higher education, ICT has begun to yield significant influences and substantial impacts on the way we teach and learn. Fundamentally speaking, education is a socially oriented activity and quality education has traditionally been offered by instructors with the highest academic degrees in their field. Teaching and learning primarily occur in a face-to-face interactive setting. Instructors with top credentials often teach students in a formal educational institution and teacher-centered instruction of knowledge characterizes the obtainment of information. The emergence of ICT in education has now shifted this traditional focus to a student-centered learning situation in which all members contribute to the creation and sharing of knowledge. The rapid development and fast spread of digital media on college and university campuses has changed education in this 21st century.

The purpose of this paper is to examine the development of a digital culture in education to uncover key features characterizing members in the learning community. From the perspective of intercultural communication and based on research in cultural adaptation and teaching innovation, the author discusses the different forms of affiliation, expression, problem-solving and information circulation among the members of this participatory culture. The paper further explores the development and application of cultural competence as an appropriate and effective pedagogical strategy for educators to succeed in this participatory culture in education.

The Participatory Culture in Education

In an effort to define the concept of participatory culture, Jenkins, Ito and Boyd (2016) proposed that we view participatory culture as "a culture with relatively low barriers to artistic expression and civic engagement, strong support for creating and sharing one's creations and some type of informal mentorship where by what is known by the most experienced is passed along to novices" (p. 4). In addition, they (Jenkins el al., 2016) further suggested that members of a participatory culture often share a feeling of social connection and each member's contribution to the whole community is viewed as equally important and valuable. Comparing with people in a traditional learning community, members in a participatory culture share different forms of affiliation, expression, problem-solving and information circulation.

While conventional teaching has typically emphasized the development and teaching of content and in most cases, content from the texts, contemporary teaching and learning are more focused on application and practices, that is, competence and performance. What the content is becomes less important than how the content will be applied and used. The ability to utilize the information is being emphasized. In other words, curricula now tend to be more performance-based, oriented to the development of learners' competence in applying what is taught. This orientation to competence and performance is catalyzed by the digital media

available to teachers and learners as they have access to a variety of information, including sources of information. The learning become more student- rather than teacher-centered as what the content is tends to be less important than how the content will be applied. Therefore, teachers are now functioning more like coaches and mentors rather than content experts. Concomitant with the change of their functionality in the educational setting, the affiliation between teachers and leaners in the learning community become different from what it was as sources of information are equally accessible to all members.

In addition to affiliation, with the wide spread of contemporary ICT, members of a learning community have numerous ways of expressing themselves. Teachers and students are no longer limited by physical environment of the learning place; they can express themselves whenever they like and wherever they are. Not only do they have the freedom in time and space, but also in platforms as well. There are a multiple levels of media platforms through which they creatively express themselves. Further, members of a participatory culture tend to collaborate more when dealing with challenges and solving problems as they are more connected with each other than ever before. Enhanced by the digital media available to them, they are much more likely to work in teams, formal and/or informal groups, online and/or online settings, which promotes collaboration amongst members of the culture.

Furthermore, in a participatory culture, the circulation of information is substantially facilitated by the wide spread of ICT on college and university campuses. Not only do learners learn from their textbooks, their teachers and peers, they also create meaningful content by themselves as they publish their views and constantly share their expressions with members of the communities. Because of the opportunities for members to freely publish their views via the media platforms available to them, the circulation of their published content is constant, speedy and widespread. Members of a participatory culture in higher education is on longer limited in creating and publishing relevant content as the barrier for information circulation no longer exists for the community.

In the last few decades, as pointed out by Lai (2008), learning has increasingly became a social and communal activity which has primarily turned into a constructive process in which learners actively participate in the construction of knowledge through close affiliation, creative expression, collaborative problem-solving and speedy and large scale circulation of content. All of these is made possible through the digital form of media.

The Digital Media Generation

Given learning as a social and communal activity, compared with the previous generations of learners on college and university campuses, the digital generation are much more capable in acquiring, generating and circulation information available to them. They become much more involved in their learning as the activities are more often self-spontaneous motivated by their desire for close affiliation and total inclusion. They are more satisfied with their learning outcome as well when they can actively involve themselves in expressing themselves and in creating content for circulation.

In their study of generation Z (born and raised in 1990s and 200os), Singh and Dangmei (2016) found the digital generation was born and raised with the social web and "they are digital centric and technology is their identity". They are most ethnically diverse and technologically sophisticated who prefer informal, individual and straight way of communicating. For this Do-It-Yourself generation, "Social networking is a vital part of their

lives" (Singh & Dangmei, 2016). Schawbel,(2014) found that the digital generation is "more entrepreneurial, trustworthy, tolerant and less motivated by money" as they tends to be more realistic and more optimistic about the future. This generation is also found to be impatient, instant-minded, lacking the ambitions of previous generations; they have acquired attention deficit disorder with a high dependence on the technology and a low attention span, individualistic, self-directed, most demanding, acquisitive and materialistic (Generation White Paper, 2011). They are sensitive about natural resources and conscious of environmental conservations (Mihelich, 2013); they desire to be heard, are technology savvy (Slavin, 2015), but have not demonstrated the ability to put things in perspective, analyze them and come up with a decision (Coombs, 2013).

As research findings demonstrate that learners on college and university campuses, the digital generation characterize themselves as technology savvy, instant-minded with a short span of attention. They are more socially connected with others around them and they are more realistic and practical in orientation. As such, they welcome curricula that are of diverse interests, practical and useful. In their eyes, learning is an activity-based acquisition of applicable information that enhances their performance and competence in life and at work. The ICT savvy digital generation are particularly strong in using all sorts of media tools and platforms to affiliate with others, to express themselves, and to involved in problem-solving, content creation and distribution. They are a group of strong participants who like to involve themselves in the community, have the skills needed to access information and share it with others in no time. They are also highly capable in creating content and distribute them. Thus, consistent with research findings, the kind of education they need is one that would enable them to critically evaluate the information available, synthesize what they have acquired and analytical skills for content creation.

Developing Participatory Cultural Competence

Given learning as a social activity in this digital media age, it's ideal for all educators to adapt to this participatory culture quickly, develop participatory cultural competence to enhance their teaching effectiveness for the digital generation. To begin to adapt to the participatory culture, digital competence (or skills) are necessary literacy skills for the twenty-first century. Jenkins et al. (2006) define this literacy as skills that enable us to participate in the new communities emerging within a networked society. According to them (Jenkins et al., 2006), these skills consist of:
- play (the capacity to experiment with the surroundings as a form of problem-solving)
- performance (the ability to adopt alternative identities for the purpose of improvisation and discovery)
- simulation (the ability to interpret and construct dynamic models of real world processes)
- appropriation (the ability to meaningfully sample and remix media content)
- multitasking (the ability to scan one's environment and shift focus)
- distributed cognition (the ability to interact meaningfully with tools that expand mental capacities)
- collective intelligence (the ability to pool knowledge and compare notes with others toward a common goal)
- judgment (the ability to evaluate the reliability and credibility of different information sources)
- transmedia navigation (the ability to follow the flow of stories and information across multiple modalities

- networking (the ability to search for, synthesize and disseminate information
- negotiation (the ability to travel across diverse communities, discerning and respecting multiple perspectives, and grasping and following alternative norms)

The main categories of 21st skills, based on The Assessment and Teaching of 21st Century Skills –project are:
  I.   Ways of Thinking
  II.   Ways of Working
  III. Tools for Working
  IV.   Living in the World

Specifically, these include:
1. Creativity and innovation
2. Critical thinking, problem solving, decision making
3. Learning to learn, Metacognition
4. Communication
5. Collaboration (teamwork)
6. Information literacy
7. ICT literacy
8. Citizenship – local and global
9. Life and career
10. Personal & social responsibility – including cultural awareness and competence
   'Tools for working' was the group which mainly focused on digital skills.

The concept digital competence is an emerging concept and related to the development of technology as well as the political aims and expectations for citizenship in a knowledge society. It consists of a variety of skills and competences, and its scope is on several areas: media and communication, technology and computing, literacy, and information science. Digital competence consists of 1) technical skills to use digital technologies, 2) abilities to use digital technologies in a meaningful way for working, studying and for everyday life in general in various activities, and 3) abilities to critically evaluate the digital technologies, and 4) motivation to participate in the digital culture. Digital competence is regarded as a core competence in policy papers; in research, however, it is not yet a standardized concept. Several policy- or practice-related projects are currently working to find a common and acceptable definition.

Conclusion and Implications

Digital technologies have the potential to support and shape a pedagogy which is more active, participatory, personalized, flexible, and inclusive (Laurilland, 2008).While it is acknowledged that the socio-political factors discussed in the previous sections may discourage institution-wide use of technologies in teaching and learning, and it is likely that these macro factors would not disappear in the short term, it is believed that at the micro or grass root level technology use can have an impact on student learning if there is a better understanding of the pedagogic potentials and a wider dissemination of exemplary and creative use of these technologies to show how they can be embedded in teaching to enhance student leaning outcome.

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Stakeholder Engagement and Involvement Towards Child and Growth Development During Pandemic: A Framework on Correspondence Education

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Abstract

The COVID-19 pandemic has significantly impacted children and adolescents' lives, leading to psychological problems and PTSD symptoms. In the Philippines, research on child and growth development during the pandemic is limited, emphasizing the need for better preparedness and quality education. The study investigated stakeholders' involvement in child growth and development during the pandemic, providing a framework for correspondence education. The study used mixed method from division of Manila schools using four point likert scale. A study using Urie Bronfenbrenner's ecological model found that stakeholders are involved in accessing online modules but less engaged in planning and development. They are highly involved with teachers but less engaged with Barangay assistance. Stakeholders are also involved in teacher assessment and feedback but less engaged with school heads. Modular distance learning is used, but parents face difficulties in integrating their child due to work and chores. Stakeholders' involvement is low, and school heads should involve stakeholders in planning and utilizing local government assistance for financially challenged families. Teachers should adapt best practices, communicate progress updates, and minimize activities, while parents should improve the learning environment and reduce distractions.

Keywords: Modular Distance Learning, Child Development, Child Education, School Stakeholders

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Introduction

The COVID-19 pandemic has significantly impacted children and adolescents' daily lives, causing immediate and long-term impacts on their growth and development due to health, economic, and sociopolitical disasters. In China, some school-aged children, adolescents, and young adults have higher levels of psychological problems and PTSD symptoms (Liang et al., 2020; Zhou et al., 2022). In Italy, a nationally representative sample of Italian adolescents found that youngsters are concerned about the pandemic's detrimental scholastic repercussions (Buzzi et al., 2020). Educational concerns and depressive symptoms may be stronger during the pandemic for people in higher grade levels in both China and Italy (Buzzi et al., 2020; Zhou et al., 2022).

The Philippines has made progress in ensuring the rights of Filipino children through legislation, service improvements, and more accessible participation. However, research on child and growth development during the pandemic remains a gap, with mental health disorders impacting 10% to 15% of children and 16.8% of adolescents attempting suicide (Berger et al., 2019). Early detection of these disorders is crucial for proper treatment and prevention of poor health and social repercussions (Dix et al., 2020).

The COVID-19 pandemic threatens to exacerbate these figures, posing a threat to the delivery of healthcare services in the Philippines, including those related to children's growth and development. The study investigated stakeholders' involvement in child growth and development during the pandemic, providing a framework for correspondence education. It is crucial to examine how stakeholder engagement and involvement in child and growth development played out during the first year of the pandemic, particularly in the formulation and implementation of correspondence education. This will enable the government, educational institutions, and Filipino families to better prepare for future crises and ensure children continue to receive high-quality education.

Theoretical Framework

This study was anchored on Urie Bronfenbrenner's (1979) Ecological Model. Due to prolonged COVID19 duty hours-related mental stress and other mental health difficulties, these parents may be harsh with their children (Ramaswamy & Seshadri, 2020). The microsystem is a child's immediate environment, including relationships and organizations like family, peer group, and school setting. It is crucial to note that the microsystem remains intact during a crisis, providing research on its impact on development. Early data can help develop a plan to move forward and act quickly (Sim & How, 2020). This Theory provides a substantial explanation of a child's growth and development during a pandemic, as well as how children are influenced by it.
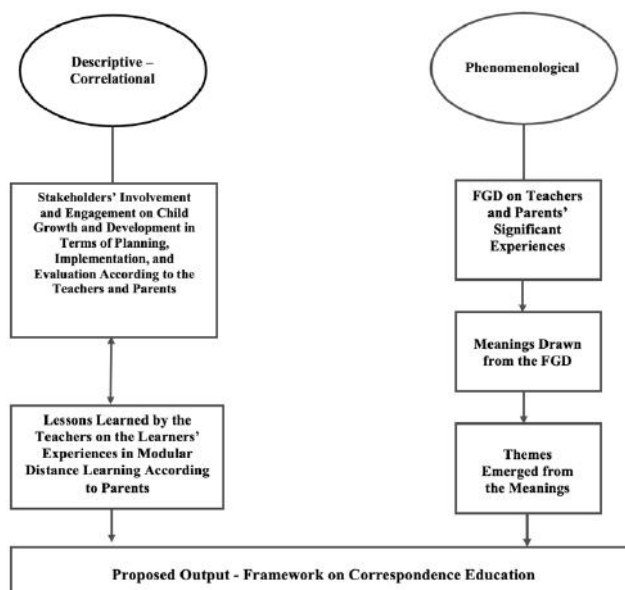
Figure 1. Conceptual Framework

This study utilized Descriptive-Correlational and Phenomenological designs to assess stakeholders' involvement in child growth and development during the pandemic. The Descriptive-Correlational part assessed stakeholders' involvement in planning, implementation, and evaluation, while the Phenomenological investigation involved teachers and parents providing insights on their experiences with the Modular Distance Learning Approach. The results were analyzed through Focus Group Discussion (FGD) responses, resulting in themes for Correspondence Education framework.

This study examined the stakeholders' involvement and engagement in child growth and development during pandemic. The results of the study were used to provide a framework for correspondence education. Following the conceptual framework presented the following hypothesis was measured:

Ho₁ There are no significant differences in the extent of the stakeholders' practices in correspondence education when grouped according to their responses.

Ho₂ There are no significant differences in the extent of the stakeholders' encounters with the issues or challenges in correspondence education when grouped according to their responses.

This study was conducted in using 4 point likert scale researcher-made instrument to gather data in four public elementary schools in the Department of Education - Division of Manila, Philippines. The study involved 110 teachers and 225 parents in quantitative and five (5) teachers and five (5) parents for qualitative sections, focusing on stakeholders' involvement and engagement in child growth and development during the pandemic. The respondents were teachers and parents from four public schools in division of manila. The schools used correspondence education during the Academic Year 2020-2021. The study utilized Slovin's formula and simple random technique to compute samples, with all respondents being elementary teachers from selected locales with firsthand experience in engaging school stakeholders.

Conclusions

The study reveals that teachers and parents have been involved in various aspects of correspondence education during the COVID-19 pandemic. Teachers have engaged themselves in planning, while parents have also been involved in implementation. Teachers have been involved in evaluation, reflecting their involvement in child and growth development. The teachers' encounters planning issues are related to converting activities and content into modules, online/distance learning, and lack of free resources and tools from education technology companies. In terms of implementation, both teachers and parents agreed that implementation is less involved due to unfavorable home learning environments and lack of experience with instructional technologies.

A one-factor analysis of variance with repeated measures showed significant differences between the variables, rejecting the null hypothesis and accepting the alternative hypothesis. The best practices of teachers and parents include health protocols, conducted online meetings, open communication with teachers, organization in module distribution and retrieval, provision of guidance, effective time management, and conditioning the child. However, parents face difficulties in managing their time, dealing with child attitude and behavior, keeping up with the study schedule, absence of more-knowledgeable others (MKO), being overwhelmed with module activities, and environmental distractions.

The effects of modular learning and teaching on child learners include the inability of parents to provide learning, learners struggling with parents, diminished performance and distorted study habits, poor learner engagement, learning from amusing topics, collision of parent work and academic involvement, and poor learning engagement due to the modality employed. The 'Redondo's Correspondence Framework' is proposed as a framework for executing the modular distance technique, known as Correspondence Education, which was widely adopted by most schools in the Philippines during the pandemic.

The study found no significant differences in the responses of teachers and parents to issues or challenges in correspondence education. However, there was a significant difference in their responses to planning in correspondence education. Teachers were more convinced about preparing content for modules and online/distance learning, while parents believed they lack free resources and tools from education technology companies. The study indicates that there are no significant differences in the extent of stakeholders' encounters with issues or challenges in correspondence education when grouped according to their responses, but there were indications that parents viewed differently in terms of parameters in correspondence education.

The learner is also overwhelmed with module activities, as they are overwhelmed by the activities that need to be completed for a week. Environmental or home distractions like noise, games, siblings, and peers can also pose a challenge.

Overall, parents face various challenges in managing their time between home and work, dealing with their child's attitude and behavior, keeping up with their study schedule, and dealing with environmental or home distractions. By addressing these challenges, parents can help their children succeed in modular classes and improve their overall learning experience.

The findings are congruent with Vonderwell's (2019) study on learner participation revealed that remote learner engagement and patterns are influenced by technology and interface

characteristics, content area experience, student responsibilities, instructional tasks, and information overload. Effective online learning requires interdependence, and instructors can detect student needs and scaffold learning by closely monitoring student involvement and patterns. During the COVID-19 pandemic, universities face challenges in providing and using online and e-learning systems, such as Blackboard. Understanding the adoption drivers and primary problems of contemporary e-learning systems is crucial for successful use. However, there is a gap in knowledge about the critical challenges and factors that shape e-learning usage. This study provides important recommendations for policymakers, designers, developers, and researchers to better understand the key factors of successfully using an e-learning system during the pandemic (Almaiah, 2020).

Framework on Correspondence Education for Enriched
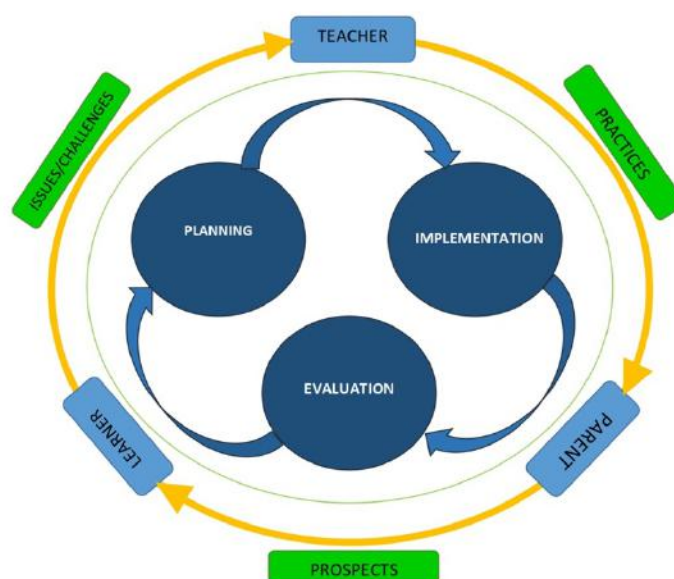
Figure 2. Redondo's Correspondence Education Framework

The framework developed based on the result of the study indicated that modular distance technique, also known as Correspondence Education, is a widely adopted strategy in the Philippines during the COVID-19 pandemic. To effectively implement this technique, schools should involve all stakeholders, including teachers, parents, and learners, in the planning and development process. This involves teachers, module writers, parents, and publishers on digital platforms.

Stakeholders are involved in accessing online modules during the pandemic, but they are less engaged in planning and developing these modules. They are highly involved with teachers who can provide answers to their queries, but are less engaged with assistance from the Barangay, such as internet connection or financial assistance. Stakeholders are also highly involved with the assessment and feedback activities of teachers, but they are low in communicating with school heads on feedback regarding modular learning.

Teachers and parents have significant practices in employing modular distance learning on their children. They observe local/national health protocols for distributing, receiving, and retrieving modules, and implement 'kamustahan' to check on progress and how parents cope with providing guidance. However, parents face difficulties in getting their child on board

modular learning due to work and chores. In some cases, learners are left to independently answer their modules due to the absence of an MKO. Learned learners are observed to be overwhelmed due to the number of learning activities in the module, and distractions at home often beset them. This results in poor modular engagement due to demotivation due to abrupt changes in the learning platform.

Quantitative findings indicate that stakeholders are involved and engaged in the planning, development, implementation, and evaluation of modular distance learning during the pandemic. Parents face difficulties in facilitating learning engagement, such as internet disruptions and environmental distractions like noise, peers, and games. Evaluation and feedbacking are highly involved and engaged by stakeholders, but low in terms of planning and development and implementation.

Effective communication systems should be in place to provide updates and feedback mechanisms for learners' progress, including their challenges. Parents should inform teachers about home issues such as resources, discipline, and guidance provided to students. Curriculum planners and module writers should minimize the number of activities in modules to avoid overwhelm. Teachers should also undertake active home visits to provide relevant ways to interest students in learning through modules. Parents should also search for ways to improve the learning environment and decrease distractions while modular study is in progress.

Recommendation

School heads should involve stakeholders like parents, barangay officers, and the community in the planning and development of modular learning modules to provide individualized attention and support for students' growth and development during the pandemic. They should also tap into the local government for internet connectivity packages for families who cannot afford it. School heads should establish linkages with non-government units and the local government for assistance to financially-challenged families.

School heads should identify the best experiences of stakeholders and cascade it to teachers for adjustments or emulating best practices. School officials should ensure that teachers and parents are on the same page when implementing modular distance learning for child students. Teachers should be able to describe how modules should be used to increase student participation.

Effective communication systems should be in place to provide updates and feedback mechanisms for learners' progress, including their challenges. Parents should inform teachers about home issues such as resources, discipline, and guidance provided to students. Curriculum planners and module writers should minimize the number of activities in modules to avoid overwhelm. Teachers should also undertake active home visits to provide relevant ways to interest students in learning through modules. Parents should also search for ways to improve the learning environment and decrease distractions while modular study is in progress.

The study is limited to the teachers and parents from four public elementary schools in division of manila. The study does not include public schools in other cities in the national capital region (NCR) and private academic institutions. The study only takes the data and

information for the research during the duration of the school year 2020-2021 and does not cover other academic school year.

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Primary School English Teaching During COVID-19: Preliminary Results of Three Single Case Studies in Rural Schools in Costa Rica

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Abstract

COVID-19 emerged as a pandemic that paralyzed the educational world in 2020. The Costa Rican Ministry of Public Education (MEP) took up two modalities, distance education (2020) and combined education (2021), with in-person education finally restored in 2022. This multiple case study consists of three single case studies in three different educational directorates in Costa Rica's Huetar Norte Region: San Carlos, Norte-Norte, and Sarapiquí. The three studies collected and triangulated data from 15 primary-school English teachers using semi-structured virtual interviews, document gathering, video recordings, photo-elicitation, and body mapping. Content analysis was performed using WebQDA and ATLAS.ti to categorize the data. This multiple case study aims to describe the perceptions of primary English teachers regarding distance, combined, and in-person education to increase understanding of the educational context during the health crisis. The first study is completed, the second study is in the final stages of data interpretation, while the data are currently being analyzed for the third study. Some preliminary results include identification of the tensions experienced by teachers as well as the emergence of self-efficacy skills required to comply with the modalities, the lack of coordination and communication between the Ministry of Public Education and the school districts, and the distinctive characteristics and challenges of each modality. This multiple case study seeks to expand on existing literature and to better apprehend the phenomenon of the pandemic and its educational implications in rural communities in Costa Rica.

Keywords: Costa Rica, COVID-19, Combined Education, Distance Education, English Teaching, In-Person Education, Rural Schools, Qualitative Research

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Introduction

In 2020, the pandemic imposed a pause in the world in all socio-economic aspects and had a particularly strong impact on educational matters. In Costa Rica, the Ministry of Public Education (MEP) analyzed various scenarios to better provide for the students who were sent home at the beginning of March 2020. That year, distance education (or emergency remote teaching) became the official teaching modality. The following year, combined education took place as a new modality. Lastly in 2022, in-person education was restored, after practically two years of pandemic. This study focuses on three single descriptive case studies in three regional directorates of education: San Carlos, Norte-Norte, and Sarapiquí. The units of analysis were the educational modalities, and the focus was on 15 primary school English teachers from the different directorates. The 15 teachers were selected under the same criteria of teaching in rural areas, in low-population schools. Inductive qualitative research was employed with the aim of comprehending the teachers' perceptions and experiences to come to a better understanding of teaching and learning processes during and after the pandemic.

Research Context and Methodology

The first study on distance education took place towards the end of 2020. This collected data on four English teachers (two males, two females) from the San Carlos Regional Directorate of Education via semi-structured virtual interviews, document gathering, and video recordings. The second study regarding combined education started in late 2021, in which data were collected on six teachers (two males, four females) from the Norte-Norte Regional Directorate of Education via interviews, document gathering, and photo-elicitation. Finally, at the beginning of 2023 the study on in-person education began collecting data on five teachers (three males, two females) from the Sarapiquí Regional Directorate of Education in the form of interviews, data gathering, and body mapping. All data collection techniques aimed at creative co-construction in the meaning-making process with respect to the distinctive educational modalities employed between 2020 and 2023. The selection criteria for the participants included these being English teachers with over five years' experience working for the Costa Rican Ministry of Public Education (MEP), with tenured positions, who working in small schools in rural communities. Prior to the data collection processes, the participants signed letters of informed consent that guaranteed confidential use of the data. The interviews and other video and visual information were transcribed prior to coding. Analytical memoing, to reflect of the data sets, was utilized during the three studies. Member checking was also used to validate the preliminary results.

The data analysis of the three single case studies was based on content analysis using two software programs for qualitative data: WebQDA (Costa et al., 2019) was used for the first study, while ATLAS.ti (ATLAS.ti Scientific Software Development GmbH, 2022) was used for both the second and third studies. Content analysis entailed full familiarization with the data sets, inductive descriptive coding, identification of semantic patterns within the codes, clustering categories, identifying, and naming domains, and description of salient themes (Hatch, 2002; Braun & Clarke, 2012). Once the last study is fully examined and the data interpreted, analysis will be made through a multiple-case study considering the evidence of the three studies to examine the educational phenomenon of teaching and learning via the distinctive modalities that took place in northern Costa Rican rural schools during COVID-19.

Results

For the proceedings, some results will be presented from single case studies 1 and 2, while only preliminary results are provided for case study 3. With respect to the distance education case study, though there were several results found, only two will be fully addressed. Interviews were carried out in Spanish, although quotations were translated into English for ease of reading in this paper.

Distance Education in the San Carlos Regional Directorate of Education (2020)

As a consequence of the abrupt interruption of the school year in March, 2020, and as a way of guaranteeing the continuation of the educational process in the country, the Ministry of Public Education (MEP) adopted the modality of distance education. This process was characterized by four scenarios created according to students' access to both internet connectivity and technological devices. Additionally, teachers were required to create self-study guides that included the contents to be studied along with brief explanations thereof, activities to promote the autonomous learning of students, and finally, a self-evaluation checklist that included the expected learning outcomes. In rural areas, these guides were collected from schools by parents on the days they picked up food packages, and students then had a month to complete and return them (MEP, 2020). Despite being called distance education due to the promotion of autonomy, self-regulation, and the physical distance between teachers and students, Hodges et al. (2020) point out that this modality in fact should be considered emergency remote teaching (ERT) since the model was unplanned, arising from the need to quickly respond to an unforeseen phenomenon affecting the educational system.

The teachers included in the study experienced a plethora of feelings at the beginning of the pandemic and during the 2020 school year. Though some of these had positive connotations, most can be seen as negative, including feelings of uncertainty, fear, nervousness, sadness, and stress. At the very beginning of the pandemic, the teachers felt doubt, concern, and confusion. They experienced a sense of helplessness, with no clear idea of how to go about the teaching process. Everything became more difficult as they had to plan and somehow continue to "teach" remotely. Numerous difficulties were encountered, including problems of lack of adequate internet connectivity, vagueness in the guidelines to be followed, and problems in communication processes with parents, among others. Every aspect of distance education was new to the teachers; thus, they rapidly began to feel tired, overwhelmed, and overworked. One teacher participant explained, "In order to teach, I had to immerse myself in virtual media, something I was not used to, at least for teaching. Also, designing the self-study guides for the first time, I did not know how to do them. It was very challenging, not impossible, but very difficult indeed. While designing the guides, it was very confusing, with so many changes and new guidelines happening all the time, some teachers understood things in one way while others understood something completely different. Nothing made sense, everything was confusing. We, the teachers, were scared since we did not know how to do anything, and all the responsibility was on us. It was very stressful and challenging."

In the rural context in which the participants worked, they experienced discrimination with regards to some of the decisions made by MEP. Another teacher participant expressed:

> At MEP, they make decisions "behind a desk" without fully understanding that some
> teachers live under very different circumstances, in poor areas, where children have

very limited or no access at all to many things. I felt limited too since I wish I could teach virtual classes but, in our case, it was remote teaching since the families did not have devices or connectivity, sadly.

Despite their negative feelings, the teachers developed a keen set of self-efficacy skills, which included personal, reflective, and technological skills. In terms of personal skills, the teachers developed the ability to proactively undertake various tasks as personal objectives with the main goal of continuing with the teaching process; for example, they paid for ink, printers, and paper to ensure that all students had access to the materials, they went to the schools to drop off and pick up students' work, and they drew on a wide range of mechanisms to communicate with the students' parents, such as calling them, sending notes, asking other parents to contact them, and taking the time to explain individually to each parent how to use the self-study guides. In terms of reflective skills, they developed empathy in analyzing the situation of students' families and their contexts to see what was required to meet the students' academic objectives, also modifying guidelines as necessary so that students could more easily continue with their learning paths. Generally speaking, they were very reflective on the issue of internet connectivity in areas where the families lived and when these had little money for telephone plans. Teachers engaged in professional development activities given that they were keenly aware of the importance of having new tools to enable students to continue to progress under such challenging conditions. With respect to technology skills, as part of their efforts to make the distance education process more accessible to students, teachers researched and learned how to better reach out to their students by creating videos to explain the self-study guides. They further collated lists of websites to use and recommend to students, and employed other technological platforms (such WhatsApp, the most used platform for education during the pandemic) so that students could access the materials and self-study guides.

Combined Education in the Norte-Norte Regional Directorate of Education (2021)

After almost an entire year of distance education and careful analysis of the public health crisis, the MEP decided to gradually open schools and allow students to go back to on-site, face-to-face classes under certain restrictions. 2021 thus became the year of combined education; a model that shared some similarities to blended learning and included the continuation of autonomous work from home with self-study guides and periodical classes at school. Every group was split-up into two or three sub-groups to comply with the protocol of social distancing; schools created special schedules and assigned students specific days in the week in which they were to work from home or go in to school; nevertheless, parents were given the chance to decide whether their children adopted this model or continued their education under a full distance education model (Elizondo-Mejías et al., 2023; MEP, 2021a). During face-to-face English as a Foreign Language (EFL) classes, teachers were required to work on activities from the self-study guides to develop oral skills: listening, and oral production. These activities were part of the four main "moments" incorporated into the self-study guides: connection, clarification, collaboration, and application (MEP, 2021b).

During 2021, teachers characterized the management processes both at a macro and micro level as highly challenging. MEP-based management was defined by teachers as focusing mostly on safety protocols and issuing guidelines regarding pedagogical mediation and logistics. Teachers felt that guidelines were sent abruptly and changed constantly. One of the participants stated, "When they [the MEP] change new norms and guidelines, we have to execute them and try to find solutions; these constantly change." These changes were visible

in the decision making; another participant pointed out, "There are things that change overnight; in the end, you don't know if instructions were privately sent to school principal or district supervisors which then need to be communicated to everyone else [teachers]." On the other hand, school management by the school principals was described as more flexible and supportive in terms of providing supplies for photocopies and schedule flexibility to those teachers working in more than one school.

One of the most revealing aspects during combined education was the fact that although the intention was to work under only two modalities (face-to-face and distance), many other sub-modalities arose, such as regular in-person education, irregular in-person education, synchronous distance education and asynchronous distance education. One of the participants stated, "There was a special schedule so that everyone was able to receive the same number of lessons; however, from five regular face-to-face lessons I had before the pandemic, only two were taught during combined education; the other lessons were used to work with students who were in the full distance modality, those who did not have to come to school on a given day, and those who were able to connect up virtually." These modalities arose as the result of school infrastructure, classroom size to respect social distancing, and the parents' decisions as to whether or not their children went back to school or kept studying from home.

In-person Education in the Sarapiquí Regional Directorate of Education (2022)

The 2022 school year was characterized by the return to face-to-face classes, with all students required to attend school every weekday. The only public health safety measure was the use of face masks from February to May and constant hand washing. In terms of methodology and content, everything was supposed to go back to the way it had been before the pandemic hit two years previously; for EFL classes, activities needed to promote the development of the four language macro skills, and all contents from the 2017 curriculum were supposed to be covered. The only difference was that in 2019, the school year had been divided into three terms of three months each; in 2022, the MEP decided to change to two terms a year. Finally, due to the educational lag provoked by the pandemic, teachers needed to carry out a diagnostic process to determine which contents from previous years needed to be reviewed and incorporated to help students level up and recover from the marked learning gaps that occurred in both 2020 and 2021.

During 2022, with the official recommencement of face-to-face classes, teachers faced several new challenges. The re-adaptation process was challenging to all study participants. This process affected the daily routines of the teachers since it implied cognitive, emotional, and educational transitions from the way things had occurred both prior to and during the pandemic. At the beginning, certain public health protocols remained in place, with mask-wearing, the need to maintain social distance among students, and the avoidance of using fans leading to difficulties including health problems for the teachers. They had to speak louder which affected their throats. Additionally, in the rural areas where they worked, the weather is very hot, yet they were not allowed to use the classroom fans as they had previously done, which caused discomfort both for teachers and students. The teachers further alleged that it was difficult for them to articulate English sounds correctly, which also made it difficult for the children to learn to pronounce words properly since the masks blocked the view of the pronunciation process. A participant stated, "Wearing the mask all day is tiring, plus while I wore it, I had to speak to the children, trying to pronounce words that as you know, especially in English, it is all about articulation as one speaks, one pronounces specific words and phonemes so that they [the children] can understand better."

Additionally, the re-adaptation process involved a reduction of class time because both teachers and students had to engage in more extracurricular activities than was customary prior to the pandemic. One teacher stated that "even when the students miss one day of class, everything gets behind significantly. Now there are the student games related to physical education, so the students get pulled out of school to attend different sport events. I know they [the students] are representing the school, but when they come back, they don't know the topic, don't bring homework, they just get behind; they are lost, and classwork is greatly reduced." This class reduction aspect is linked to work overload since teachers were also expected to coordinate and work on extracurricular activities, such as art and English festivals. One teacher reported, "Yesterday, for example, it was 6:15 p.m. and we [some teachers] were just leaving the school since we had spent the day decorating for the school festivals. Today, we began work at 7:00 in the morning and worked until 3:00 in the afternoon putting everything back in order after the festivals. It is too much work, and we don't get any acknowledgement for it. We do it for the children, we do it for them." Due to public health protocols and the extra work of other school activities, the participants in the study experienced general exhaustion including physical, mental, and emotional weariness. One participant expressed how she was totally "exhausted and drained to the point that all I want is to be on vacation, to simply rest and load batteries to continue teaching."

There were also challenges that impacted on the learners. Two specific ones stand out: lack of education competencies and educational lag. Lack of educational competencies refers to the lack of some competencies on behalf of the students such as socialization, a sense of accountability, collaborative skills, assertive communication, autonomy, and self-regulation, among others. One participant stated, "Social behavior was very affected. Some students were in second grade, yet their behavior felt more like they were first graders." Another teacher stated how the "discipline in the students had no limits, students were aggressive and not willing to collaborate." Students lacked motivation to come back to face-to-face classes; some students "did not click with the return to normal classes." In addition, the teachers in the study emphasized how the students in general were behind where they should be academically. As part of the educational lag, the students did not have the knowledge they were expected to have. One teacher reflected on how she had a class that she had taught using combined education in 2021, and half her class did not know the topics covered that year. She recalled 2022, the year in which students and teachers returned to normality, as a year "where students' minds where blank, as if they did not retain any information, as if all teaching was erased and all learning became nonexistent, as if they had not learned any English at all in two entire years. It was devasting, it happened in 2022, and I think it continues [in 2023, when the study data were collected]."

Conclusions

From all three single case studies, some preliminary conclusions can be drawn. From the study carried out in San Carlos (case study 1), it can be concluded that during distance education in 2020, of all the significant number of feelings expressed by the teacher participants, most of these had negative connotations. However, the self-efficacy skills of the teachers were key to coping with the distance education modality to promote the academic success of the students. In Norte-Norte (case study 2), even when combined education was meant to consist only of regular face-to-face classes and work at home, the modality employed in the rural schools the participants worked at was fragmented into 5 sub-modalities for two specific reasons: logistics in the schools (infrastructure, school management, size of groups) and family decisions (convenience of families to keep students

at home). During 2021, MEP-based management was characterized by ambiguous and changing guidelines that were open to interpretation; however, school-based management provided the support that teachers felt was lacking in the educational management. In Sarapiquí (case study 3), the re-adaptation process became a challenge due to students' lack of educational competencies and educational lag as a result of having stayed at home for almost two years. In addition, the teachers felt overworked, both due to classwork and other extracurricular and administrative tasks which led to a sense of general exhaustion.

As mentioned before, two of the studies have concluded while the last one is still undergoing processes of data analyses and interpretation, with a view to arriving at a consolidated outlook on the Huetar Norte Region in Costa Rica. The researchers advocate in favor of qualitative research as a reflective endeavor that can capture the essence of the human dimension in educational settings. It was the qualitative research approach that facilitated engagement with the participants during the harsh times of the pandemic. Qualitative research should be celebrated as it places greater value on social phenomena as experienced by teachers within their educational contexts.

Acknowledgments

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A Qualitative Perspective on Student Teachers' Experiences of Social Science Teaching and Learning in South African Multicultural Classrooms

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Abstract

This qualitative study is an investigation of final years Social Science education students' perceptions of Social Science teaching and learning in South African multicultural classrooms. The current South African schooling landscape is of a multicultural setting, where learners from different racial, ethnic, cultural, and socio-economic backgrounds are admitted. This study seeks to ascertain the perceptions of student teacher's engagement with diverse learners in Social Science multicultural classroom and the influence it has on the teaching and learning project. Through a qualitative research methodology, data was gathered from Focus Group Discussion (FGD) sessions with three groups of five teacher education students from the same race, in their final year, specializing in Social Science teaching. The results of the study indicate that student teachers find the teaching of Social Science in a multicultural classroom very challenging, irrespective of their race, culture, or socio-background. The study therefore recommends regular exposure to diverse learners through mandatory teaching practice at multicultural schools, appropriate training, and development throughout the students' teacher training with supported policies and integration of social justice into the curriculum content.

Keywords: Social Science, Teaching and Learning, Multicultural, Perceptions, Classrooms, Diversity, Student Teachers

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Introduction

The South African Schools Act (SASA) (Act, 84 of 1996) is one the instruments designed to achieve equal and non-discrimination in education. By articulating the stipulations of the Constitution, this Act effectively advanced the opening of doors of learning to all races and created opportunities for all to attend the school of their choice. With this policy directive, the South African Department of Education demonstrated its intention to "redress past injustices in educational provision" (DoE 1995) and to advance the democratic transformation of society, combat racism and sexism and all other forms of unfair discrimination and intolerance, and to protect and advance our diverse cultures. Whilst the desegregation of schools implied the promotion of social equality, it anticipated the creation of solid relationships amongst various races at all schools, which would ultimately promote tolerance and strengthen social cohesion and unity in South African society. The downside of the status quo remaining about teachers, triggered challenges, such as teachers having little or no understanding of the learners' social, cultural, and socio-economic backgrounds, which resulted in uncomfortable situations, especially in the Social Science classroom.

This study investigates the student teachers' perceptions of Social Science teaching and learning in South African multicultural classrooms. This study identifies challenges and opportunities regarding South African student teachers' teaching of Social Science to diverse learners, with the objective of developing knowledge and understanding of the diverse learners in the South African Social Science classroom, creating and implementing an optimal classroom experience for both teachers and learners. To cultivate respect and acceptance for diversity, through the teaching and learning of Social Science.

Literature Review

Multiculturalism created a platform for the introduction of democratic initiatives in the curriculum; pedagogy; social relations in school settings; and an understanding of participation in diverse communities, which seems to support efforts towards the acquisition of social cohesion and cultural harmony (Arslan & Rata, 2015). Hopkins-Gillespie, (2011) views multiculturalism as an enabling form of education which focuses on harnessing the abilities, skills and commitments of teachers and learners in promoting social change, nation building and competent global citizenry. In the end, multicultural education should be directed at expounding the principles and values of the South African Constitution, whilst also instilling a conducive school culture which is geared at transformation, reconciliation, inclusion, nation building and quality education.

Despite various approaches for Social Science teaching, most teachers invariably institute some form of multicultural education as the primary goal for Social Science instruction. It is in this context that the National Council for Social Studies (1994) could be viewed as the proponent, through its mission, the inclusion and inculcation of civic competence in learners. However, Arslan and Rata (2015) observed that fundamental differences exist in the way in which individuals define multicultural education. For example, according to Aydin (2012), multicultural education in the broadest sense is concerned with helping students to acquire the appropriate knowledge, skills, and values in an increasingly ethnically diverse nation-state. The Curriculum Assessment Policy Statement (CAPS) in South Africa is built on the principles of providing all learners with knowledge, skills, and values. Like teaching for multicultural education, teaching Social Science involves teaching about and for multicultural perspectives and viewpoints; establishing respect for cultural diversity; and working towards

identifying and transforming areas of injustice that inhibit the goals of democracy (Castro, 2013).

Conceptual Framework

This study wishes to acknowledge that a critical multicultural framework requires a theoretical lens that recognises the importance of racial positionality and the role that community and family play in the expectations/aspirations of identity construction (Bolgatz, 2005). Norton (2001) asserts that identity reconfiguration is the impetus behind all learning and according to this author, learners participate in learning when such learning helps them to attain the identities they desire, and as such, increases their value within the social environment. Gray (2017) is of the opinion that learners' investments in certain imagined communities and identities influence positively or negatively participation in classroom learning. The influences of imagined communities for pre-service teachers then becomes an important factor in determining how the empowered feel about teaching the controversial topics of Social Science. This empowerment forms the sense of agency that serves as a key component in pre-service teacher decisions about whether and /or how to implement aspects of critical multicultural education e.g., taking up issues, such as social justice, power, and diversity as foundational in their teaching.

Advocates of multicultural education promote the revision of the total curriculum to reflect accurately the multicultural composition of society and diverse groups' contributions to society. However, a variety of influences on the prescribed content of the social studies curriculum may have an impact on the degree to which classroom teachers include it. I contend that the curriculum contents and specifically that of the Social Sciences has a bearing on how the teacher approaches it in the classroom, and to what extent the teacher deals with those controversial themes, while embracing the diverse nature of the class at the same time.

Methodology

As a fragment of a broader part of research, this qualitative study examines how student teachers from different race groups perceive and engage a subject such as Social Science in a multicultural classroom. Student teachers to think more deeply about the learners' beliefs, values, and identities in relation to what is being learned and how these influences teaching and learning.

The study was conducted at the University of Free State, where the subject Social Science as a specialisation in the intermediate phase is offered. The University has a diverse student population that caters for students from different cultures and socio-backgrounds. The diversity of the students was of interest to me and since it assisted me. For the purpose of this study, the sampling method that I used was a mixture of purpose and stratified sampling. In stratified sampling, all the people in the sampling frame are divided into 'strata' (groups or categories). With each stratum, a simple random sample or systematic sample is selected. In this research, the target population was the final year Bachelor of Education intermediate phase students, from the University of Free State. I chose the purposive sampling, 20 participants, and further sampled the students using stratified sampling, by dividing the group into race groups.

The table below, presents the students who participated in the focus group discussion.

Table 1: Participants of the focus group discussion

Focus group	Number of students who participated
FGA A (White students)	5
FGB B (Coloured students)	5
FGC C1 & C2 (African students)	10
Total	**20**

Methods of Data Collection

Assembling people belonging to similar backgrounds together to ascertain their insights, views, beliefs, and attitudes in a coordinated discussion, is regarded as a focus group discussion (McMillan & Schumacher, 2010). Participants in this type of research were, therefore, selected on the basis that they would have something to say on the topic; are within the age-range; have similar socio-characteristics; and would be comfortable talking to the facilitator and one another (Oladeji, 2012).

The discussions were conducted with final year Social Science student teachers at the identified university. I grouped the participants according to racial groups. The rationale behind this was to garner perceptions based on South Africa's main racial groups. The FGD had a white only group of five participants; a coloured group of five participants; and two groups of five each of black African participants. The aim of the research was to capture the richness and uniqueness of everyone's perception that emanated from the natural settings of the participants' environment. The division according to racial groups allowed participants to open-up and engage freely without fear of prejudice. Although the discussion was guided by a list of questions to be asked, the dialogue took the form of free conversation, and the participants were encouraged to talk without restraint.

The discussions were audio-taped and transcribed with the permission of the participants. This was done to capture the participants' responses. In total, 20 participants took part in the FGD. The participants were male and female, obtained by means of purposive sampling, selected for fitting a particular profile, which simply means selective sampling was followed to obtain their quantity.

Data Analysis

The conceptual framework shaped my data analysis. It assisted me to develop concepts and themes and test them with participants through analysing and interacting with the collected data, while also transcribing and coding the texts. The conceptual framework assisted me in understanding and explaining how the different practices of Social Science teachers have played significant roles in perceptions of South African learners in Social Science. It assisted me to interpret how racial, ethnic, socio-economic, and cultural identities of South African learners have intertwined and interacted with their perspectives on Social Science.

Findings

In this study, the student teachers interpreted their Social Science teaching and learning experiences in various ways. Several major themes emerged from my data analysis, for the purpose of this paper only two will be discussed.

Theme 1: Social Science Teaching and Learning Experience

A description of what the participants identified as their views on their experience of Social Science in the classroom as a learner and student teacher.

• Interesting, Fascinating, and Related to Politics

This section is the presentation of how the teacher education participants view the teaching and learning of Social Science. Social Science is regarded as not as other school subjects and is viewed by many scholars as closely related to politics, which makes it a very awkward subject to teach or learn (Ucus, 2018).

The participants (FGDA) indicated they found the subject to be interesting and challenging (FGDA A1, FGDA A2). Participant FGDA A3 said it was easy to understand and relate to because it relates to what is happening daily in communities, while participant FGDA A2 indicated it was interesting depending on the type of learners you have in front of you. In relation to the views of the latter mentioned, participant FGDA5 highlighted the following aspects:

> *"I found the subject very interesting and challenging, closely related to politics. I found myself at times very uneasy about expressing myself while teaching it during teaching practice."*

The participants (FGDB B5) responded that they also found the subject to be interesting with elements of politics and in admission to that, they (FGDB B1, FGDB B3 and FGDB B4) believed the fact that they grew up in the township and were confronted daily by politics, made the Social Science classroom both as learner and teacher fascinating and enjoyable. The participant FGDB B3 further indicated that Social Science connects one to one's environment and community and that the subject can assist in shaping us. In this regard FGDB B2, stated the following:

> *"I enjoy the subject SS because it is fascinating and one always learns something new about one's community, country, and the world. I enjoy teaching it because of the interesting facts around Social Science and the impact it can make on the learners."*

The participants (FGDC1 C2 and FGDC1 C4) concur with the two other groups that they found Social Science to be very interesting because of its relation to the human being and their environment (FGDC1 C2, FGDBC1 C5, FGDC2 C8 and FGDC2 C10). The participants (FGDC1 C4 and FGDC2 C6) indicated that the element of the subject's interrelatedness to politics, also contributed to their love for the subject. FGDC2 C7 articulated the following sentient regarding the nature of Social Science:

> *"I enjoy SS because it makes me understand where I come from as a black person and why my parents and grandparents struggled that much. This subject opened my horizons to how the earth operates and how people find in it a living space."*

• Debates and Discussions

Teacher education participants had mixed views on the role of debates and discussions in the Social Science classroom. Hess (2010) is of the opinion that debate, and discussion are key elements in a Social Science classroom and should therefore be encouraged.

The participants FGDC1 C1 and FGDC2 C7 had very strong opinions of enjoying the subject due to the debates and the discussions that normally takes place in the Social Science classrooms. This sentiment was echoed by the participants FGDB B1, B4 and B5, while participants FGDA A3 and A5 did not find the debate and discussion a factor that determined the interest or enjoyment of the subject. In relation to the previous participants, FGDC2 C9 stated the following:

> *"As a student I enjoyed it even more because the debate levels became even better at university and the discussions were at a much more mature level."*

Teacher neutrality and not veering outside the curriculum are parameters for having safe discussions about controversial issues in the Social Science classroom (Hess, 2009).

• Social Injustices and Inequalities in Communities

The teacher education participants engaged with terms, such as social injustice and inequalities, and some made first encounters with challenges in communities.

The participants FGDC1 C1 and FGDC2 C9 revealed that the subject caused them to have a better understanding of the social injustices and the unequal society they live in, and this was also revealed by FGDB B3 and FGDB B4 that the subject gave them a better understanding of the social ills and problems of people living in townships and in rural areas. Camicia and Dobson, (2010) assert that learners should leave school with a clear sense of their rights and responsibilities as citizens and be prepared to challenge injustice and to promote the common good. FGDC1 C3 stated:

> *"The subject made me understand why most black people are so impoverished and why there are such deep divisions between different racial groups in South Africa. I enjoyed SS because it gives perspective to why there are social injustices and inequality in the world. I think the interest in the subject comes from the fact that I see the subject as a vehicle that can assist in the redress process."*

• Understanding of the Environment

Participants in all the groups indicated that the subject gave them a better understanding of their environment and that it installs an awareness to care for the environment and to preserve it for future generations. Controversial issues, including those that are 'high risk', have curricular relevance, as well as importance to learners' lives, their character development, and their sense of safety and security (Haynes & Karin, 2008). FGDC2 C8 stated:

> *"I started to have a better understanding of my environment and how to preserve it for the next generation."*

Theme 2: Challenges Faced by Student Teachers in Multicultural Schools

This is a description of what the teacher education participants identified as the challenges for student teachers in multicultural schools. The teacher education participants had to indicate challenges that they thought they might face or have faced while teaching in multicultural schools. They had to rely on the experiences while on teaching practice or what they anticipated would be challenges.

• Understanding Different Cultures and How to Deal With Them

Participant FGDA A1 indicated that a lack of understanding of other cultures and customs could be a challenge for pre-service teachers in multicultural school settings. FGDA A2 and A3 agreed and indicated that a better understanding of the learners could contribute to successful teaching and learning in a multicultural classroom. In relation to challenges faced in multicultural schools FGDC1 C3 made the following comment:

> *"I think we might have a challenge understanding all our learners, because we are not really exposed to multicultural schools during teaching practice."*

The literature in chapter three emphasised the importance of a good understanding of different cultures in multicultural school settings. The findings of this study provide clear evidence that most of the teacher education participants lacked knowledge about other cultures and consequently, made them susceptible to attack by people from those cultures.

• Lack of Training to Deal With Diverse Groups

FGDB B1 emphasised that a lack of training to deal with diverse groups could be a challenge for pre-service teachers. The sentiments were also shared by FGDC1 C4, who in turn, indicated that because of the reality of facing multicultural schools, pre-service teachers should deal with this during training. Teaching is a profession that revolves continuously as knowledge and technology changes and require that teachers upskill themselves frequently, thus the opportunity for professional development is critical (Landsman & Lewis, 2011). In relation to the latter statement, teacher education participant FGDA A3 agreed by asserting the following:

> *"I think it is not easy to manage diverse groups, because we are not trained to deal with diversity, or the training is not adequate."*

I share the above-mentioned sentiment, that teachers in the multicultural classroom should be provided with knowledge about several cultures of their learners, their experiences, communication styles, and learning approaches that are harmonious for all learners in the multicultural classroom (Multicultural education & curriculum, 2012).

• Black Learners Blaming Whites for Poverty and Lack of Empathy

Participants FGDA A2, FGDA A3, FGDB B1 and FGDC1 C5 were blunt and indicated that race plays a major role in how to deal with diversity. Alsubaie (2015) supports the above-

mentioned view and argues that teachers should build interactional relationships between them and their learners, to allow learners to express themselves and not offend another race group. In corroboration with the latter argument, teacher education participant FGDA A4 mentioned the following:

> *"Black learners always blame us whites for the fact that they are poor and want to make our lives difficult or even threaten us."*

The above-mentioned assumptions are isolated views and not really the view of the majority of South Africans, and those views are in most instances excuses that some ill-informed people use to defend their own limitations about reaching out to diverse people. The view that race plays a role in diversity was not openly shared and the assumption that I could make was that teacher education participants were not ready to engage further on the sub-theme, because not even probing questions could induce further responses.

• Adaptation to School and the Surrounding Community

Participant FGDA A2 thought that a challenge could also be a slow adaptation to the school, learners, and the community, while FDGC1 C1 believed that pre-service teachers must adapt to the history and traditions of a school if they want to succeed. A study by Perso (2012) indicated that learners are reluctant to participate in activities or speak in multicultural classrooms because they are learning in a new environment, unfamiliar to themselves. This may result in teachers and learners having communication, teaching, and learning challenges, because learners do not acclimatise to the classroom's atmosphere. The example that FGDB B1 gave was if the tradition at the school was for male teachers to wear ties and a pre-service teacher does not adhere to that tradition, it will make it difficult for the pre-service teacher to feel part of the school. In relation to the adaptation to schools and communities, teacher education participant FGDA A2 made the following statement:

> *"Quick adaptation to the school and the community and make sure that I know my learners and their circumstances."* Regarding the latter statement, participant FGDC2 C6 commented: *"we will have to be given proper orientation and training on the ethos and traditions of the school, the learners and the community."*

My view is that novice teachers feel, in most instances, overwhelmed in their new positions and usually must deal with many challenges in their new environment; therefore, it will take them longer to adapt. Acceptance and support by parents and other members of the community might assist teachers to adapt quicker to the school.

• Lack of Training to Deal With Discipline for Different Groups

Participants FGDA A1, FGDA A5, FGDB B1, FGDC1 C1 and FGDC1 C3, indicated that the South African education system is silent on disciplinary measures in schools, and the lack of clarity about applying discipline would make it difficult in multicultural schools. Of all the things teachers are expected to do during their professional life, classroom discipline is perhaps the most significant and is clearly of concern to many parents and teachers alike (Landman & Lewis, 2011). In relation to the latter mentioned view, teacher education participant FGDC2 C10 agreed and articulated the following:

> *"I think we will have challenges dealing with difficult learners from other cultural groups, due to a lack of understanding of how to discipline diverse learners; that is one thing our training lacks and to now deal with diverse groups, will make it even more difficult."*

The South African education system's lack of policies that give guidance to teachers on how to deal with diversity is of great concern; thus, the fear and reluctance of some student teachers to embrace diversity in schools.

I observed that the mentioned sub-theme featured only in the focus group discussions, of the black teacher education participants and realised that the need to change during a lesson to their own indigenous language comes to mind, but due to the diversity in the classroom it would not be possible.

Discussion

This study explores how South African student teachers perceive and interpret Social Science teaching and learning in multicultural classrooms. The findings indicate that Social Science is difficult to teach in a school with learners from different cultures, races and social backgrounds. Makoelle (2014) explains why participants would find it difficult, by indicating that despite all the significant policy pronouncements by the South African Department of Education, there has been silence on the inherent racial and ethnic divide which perpetuates exclusive stereotypes and conceptions about those viewed as racially and ethnically different.

In general, student teachers find it uncomfortable teaching Social Science; most of them feel that more exposure and advanced further training would benefit and equip them with the required skills, knowledge, and values, to teach without fear or prejudice. Participants were also of the opinion that exposure to the teaching and learning of different societies, cultures and communities, would benefit student teachers in developing their skills on how to interact with learners different from them. Kallaway (2009) expresses concerns by indicating that part of the problem is that nobody has trained the trainer; it is simply expected that if someone who has been a good student teacher, will become a good teacher and will therefore be aware of the skills needed to in a multicultural school.

Fair policies, laws, systems and appropriate processes. Procedural justice concerns the fairness and the transparency of the processes by which decisions in a society are made. While a fair process on its own does not guarantee a socially tolerable outcome, a fair system of law and due process are important to social justice, because they provide the mechanism by which everyone in society applies the requirements of social justice to particular cases, which is vitally important for those who have less power in society. Mogoashoa (2014) argues that teachers receive training in the various teaching and learning policies; however, some policies are not deemed appropriate to what teachers are doing in the classroom. Knowledgeable teachers can be beneficial not only to themselves but to society at large.

Recommendations

This study made several recommendations to South African Social Science student teach on how to address the challenges in dealing with diverse learners in the Social Science classroom.

Extended Exposure to Multicultural Classes

Teacher education students are currently exposed only to multicultural classes by choice, if they decide to do their experiential training (teaching practice) at a multicultural school. This study would recommend that teaching practice at a multicultural school be made mandatory and support be granted to student teachers who have problems with doing teaching practice at multicultural schools. The study revealed that student teachers avoid doing teaching practice at multicultural schools due to a lack of understanding other cultures, beliefs, and customs.

Engagement With Communities in All Socio-Economic Groups

The inhabitants of many South African public-school classrooms are from different spheres of life and learners are also from different socio-economic groups. A considerate approach to the learners is critical for the success of teaching and learning; therefore, teachers should have a broad knowledge, understanding and empathy towards all learners, irrespective of their situations. Based on this assertion, this study recommends that regular engagement with communities of different socio-economic groups in both official and on social levels, would be prudent.

Inclusion of Social Justice and Multiculturalism in the Training Programme of Social Science Teachers

Institutions of higher learning are frequently revising their programmes ensure that the curriculum is relevant to a changing world; therefore, a curriculum that addresses the challenges of society would be beneficial to all stakeholders. The establishment of partnerships between stakeholders who have an interest in education, i.e., the state, parents, learners, teachers, and other members of the community, in the vicinity of a school is critical. The recommendation to include social justice and multiculturalism in the training programme of Social Science should be regarded as relevant and is therefore suggested. If it has been done already, the recommendation would be to advocate that it be listed as priority.

Conclusion

This study enriches the current literature on student teachers' perceptions of Social Science teaching and learning in South African Multicultural classrooms, adding to the limited research in this area. My study therefore strongly suggests regular exposure to diverse learners through mandatory teaching practice at multicultural schools, appropriate training and development throughout the students' teacher training with supported policies and integration of social justice into the curriculum content.

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Science Mapping in Educational Leadership Research:
Bibliometric Analysis, 1907 to 2022

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Abstract

Educational leadership stands as a prominent research domain in education, where leaders play a guiding role, impacting educational culture and quality. With the pandemic of COVID-19 has compelled a shift to online learning for students, with educators striving to effectively engage learners in this digital landscape. Financial constraints have led to layoffs and cost-cutting in educational institutions, though some schools innovatively expanded. In response, educational institutions must forge fresh leadership strategies tailored to these unique challenges. This study utilized VOSviewer to investigate network diagrams relevant to educational leadership research. By categorizing clusters and analyzing their positional relationships, the study discerned attributes and connections within structured network diagrams, bolstering its argument. This study performed a bibliometric analysis of 8,489 papers published in the Scopus database from 1907 to 2022. Four key themes emerged: educational leadership as a catalyst for equity, inclusivity, and professional growth; educational leadership's intricate interplay with teacher development, student achievement, and school climate; The transformative impact of educational leadership in the COVID-19 era; Educational leadership is a key element in driving school improvement and development. Based on research findings, the post-COVID-19 era necessitates novel educational leadership styles, propelling teaching and learning, nurturing talent, and advancing educational objectives.

Keywords：Educational Leadership, Bibliometric Analysis, Vosviewer, COVID-19, Science Mapping

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Introduction

The analysis of leadership in education involves giving prominence to the roles of administration and management, scrutinizing alterations within the educational system and leadership frameworks facilitating the introduction of systemic changes in schools, centering on the learning procedures and curriculum enhancement, highlighting leadership within the realm of higher education, as well as considering narrative, historical context, and employing meta-analytical techniques.(Rutkiene & Tandzegolskiene, 2021)Lakomski and Evers (2022) referred to the role of methodology in the contemporary educational leadership. In general, it is common to explain how organisations, such as schools, operate to illustrate this. How to explain the value of educational leadership is an open question that relies on experience rather than analytical explanation using methodology as the default option. The ability to solve problems always takes place within certain constraints, and placing these constraints at the centre of research not only requires a wealth of remaining scientific resources, but also leads to a renewal of methodological understanding of how to study educational leadership. Yeh (2013) points out that the discipline of educational leadership is not only a sub-division of the broader study programme of leadership, but also a popular discipline in the field of educational research. Edoun (2011) shows that effective leadership and management of headmasters and school staff is a key factor in the achievement of high standards of student performance and school improvement. It is evident that research in educational leadership is essential for enhancing the effectiveness and outcomes of schools and education systems.

Educational Leadership Research

Educational leadership research has been influenced by external factors such as interdisciplinary integration, measurement and data analysis, resulting in the emergence of outcomes and issues such as disciplinary systems, theories and philosophies, metaphors, variations, levels and themes of analysis, and research orientations and methodologies (Yeh, 2013). Since the millennium, as the modern society has entered into the information age of the Internet, the ease and richness of access to information have been very different from the past. "Visual communication" is often considered as one of the most efficient communication methods in modern communication. Teams that are good at using visual aids in their work are more than twice as efficient as teams of the same level (Krum, 2013).

This research methodology allows for the visualization of past research patterns, and the conceptual clusters extracted from the analysed papers furnish solid support for our research arguments (Prelipcean & Bejinaru, 2021). The strength of infographics lies in their capacity to convey a significant amount of information within a minimal space while maintaining precision and clarity. As visual presentations, as opposed to oral or text-based presentations, they can swiftly narrate a story, illustrate relationships, and unveil structure. (Dunlap & Lowenthal, 2016). Yeh (2013) research affirms that educational leadership research is a constantly developing and evolving field that requires the consideration of multiple factors and the search for new research perspectives and themes to facilitate the development and practice of educational leadership. Future educational leaders will need to have new ways of thinking and use their wisdom to lead. This includes a deep understanding of events both inside and outside the organisation, and the ability to make sound judgements through keen knowledge. At the same time, future educational leaders will need to be adept at using network technologies to expand, disseminate and share knowledge, build partnerships, achieve leadership quality, and build competitive advantage within and outside their organisations (Tsai, 2009). The conceptual clusters retrieved from the analysed literature

therefore provide the researcher with a basis and help to identify research directions such as the most discussed issues related to educational leadership, links between practice research and emerging issues in the topic. It is clear that technological developments have influenced leadership research in various fields, but the impact on educational leadership research is rare.

The WHO has stated that there is a high risk of the COVID-19 virus spreading to the rest of the world (World Health Organization, 2020). In March 2020, the WHO made an assessment that COVID-19 could be characterised as an epidemic. The outbreak has forced most countries and regions around the world to put in place policies to prevent the epidemic, which include the closing of schools and switching to digital teaching. The spread of the novel coronavirus has led to profound changes in social interactions and organisation, as well as the education sector has not been spared (Murphy, 2020). This global crisis has not only changed the way people live their lives, but has also had a profound impact on the education sector.

This study analyses the status of educational leadership research recorded in the Scopus database, using bibliometric analysis for keyword co-occurrence network map analysis. This analysis provides a broad perspective on educational leadership research and a sequence of research priorities and hotspots to understand the impact of educational leadership research on the education sector, and the use of modern technological tools to be able to anticipate the future with foresight and bring new developments and achievements to schools and education. The following research questions are posed in this study:

    RQ1: What are some of the issues of concern in educational leadership research?
    RQ2: What are some of the implications of educational leadership research for teaching and learning?

To address these research questions, this study used the software tool VOSviewer to conduct a science mapping reviews analyse bibliometric, analysing an overview of 8,489 eligible published papers in the Scoups database. The bibliometric analysis included co-occurrence analysis visualisation.

Literature was clustered and analysed according to the network diagram to observe changes in the distribution and development of educational leadership research and to identify links between the thematic distribution of these research concerns. The findings will analyse the dialogue between scholars in the relevant fields, be analysed through knowledge mapping, and provide insights that can guide the further development of educational leadership research and greatly support the understanding of educational leadership in the post-epidemic process.

Conclusions and Discussion

Conclusion

The study identified four themes that address key aspects of educational leadership research that are critical to understanding and improving leadership in education systems. Below are the conclusions and summaries for each theme:

Educational leaders play a critical role in shaping school culture and climate to ensure equitable and inclusive educational opportunities. They can promote social equity through policy, resource allocation, and decision-making. Effective educational leaders also

encourage teacher professional development and provide training and support to improve the quality of education and promote student success.

Educational leaders' support and mentoring of teachers is critical to improving the quality of teaching and learning. They can empower teachers by providing feedback, resources, and professional development opportunities. Educational leaders' decision-making and leadership styles can have a direct impact on student achievement. Effective leaders can motivate teachers and students and promote academic achievement. School culture and climate are shaped by leaders, which is critical to the development and well-being of students and teachers.

The COVID-19 outbreak presents unprecedented challenges to education systems, requiring leaders to quickly adapt to changes and develop response strategies. Education leaders need to coordinate efforts in areas such as online learning, health and safety initiatives, and supporting student mental health. Their leadership is especially important during this period. This period also provides opportunities for education leaders to drive innovation and improve education systems.

Educational leaders play a key role in the long-term vision and goals of the school, and they can drive school improvement and development through strategic planning and goal setting. Leaders need effective communication and team-building skills to ensure that all stakeholders are involved in school improvement. Educational leaders also need effective resource management skills to ensure that the school is adequately supported to achieve its goals.

Overall, the study of educational leadership addresses several key areas, including social equity, educational quality, school culture, and crisis management. Educational leaders play a critical role in driving improvement in schools and education systems and need to constantly adapt to change and develop effective strategies. Examining these topics helps us better understand the importance of educational leadership and guides for improving educational quality and student success.

Discussion

It is recommended that further research should delve into the specific impact of different school cultures on students' academic achievement, especially in a multicultural environment. Educational leaders are encouraged to focus on specific strategies to effectively support teachers' professional growth, including what types of feedback, training, and professional development opportunities to provide and how to effectively integrate these supports.

It is recommended to study successful digital teaching cases of education leaders in coping with COVID-19 to extract best practices, especially focus on effective strategies for coordinating online learning, safeguarding health and so on.

These recommendations help to improve the practical application value of research in the field of education and provide more specific guidance for educational leaders to address current and future educational challenges.

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Educating Communities for Survival:
Building, Resilience, Sustainability, and a Healthy Society

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Abstract

Complexities and challenges in the world around food security and poverty are bringing communities to the near brink of collapse. This paper explores how social learning, education, and management skills can enable communities to actively participate in their development and sustain resources. The aim is to develop desirable traits amongst communities to create resilience and change through social learning, self-management, and resource management. Qualitative data were generated from literature, a case study of Nog community in the Free state and a purposively sampled respondent group of six lecturers using interviews and reflections. Data were categorised and analysed into themes. It was found that higher education lays the foundation for knowledge and management skills that are replicated through social learning which result in the acquisition and application of sustainable principles. The study is underpinned by (Bandura and Walters, 1977) social learning theory essential for modelling desirable traits and management skills for people to learn and change from self-defeating tendencies. This study proposes an ongoing partnership and engagement between higher education and communities for the development of resilient, resourceful, capable, and healthy communities. The implication is that government is unable to curb the increasing population and to cater for the increased needs of communities. It is thus concluded that social learning, education, and management skills can influence positive results that contribute towards communities managing change and adopting sustainable strategies that enables resilience, self-sufficiency to create a sustainable and a healthy society.

Keywords: Communities, Social Learning, Sustainability

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Introduction

One of the goals of the Sustainable Development Goals is to eliminate poverty and hunger. In the same breath, the South African National Development Plan's priority also place emphasis on eliminating poverty and inequalities. Yet, according to Statistics South Africa, (2022) about (2,6 million) and 6 percent (1,1 million) are experiencing severe inadequate access to food, respectively. To exacerbate the problem unemployment also adds to the demise of households' food security. According to Brown and Hermes (2019) the Food and Agriculture Organization (FAO) indicates that world hunger has increased, to a figure of about 150 million since 2019. Even though unemployment, lack of income, lack of education and poor morale are seemingly contributing factors. However, more food consumption than production is a challenge that can bring communities to a brink of collapse. This suggests that communities need to learn ways of sustaining themselves to survive the onslaught of food security by unlearning certain traits but learn positive traits that can help them to sustain themselves because food shortage is also linked to health problems. Besides other socio-economic and environmental issues, the other challenge is that some of the community members lack education significant in changing people's mindsets including motivation and management skills that can help them to transform their personal lives and conditions. It is thus critical to rethink of ways of building resilient and healthy communities that can cope with complexities. To that effect, responsible investment on people's education is important in enhancing food security. It is against this backdrop that education, management skills and social learning strategies are needed to build collaborative initiatives to change the direction of lack but build a resilient capable and a healthy society. Also important is to foster learning of various skills that are necessary in the changing world therefore, education is necessary including the management of production and consumption to help communities to survive.

Although South Africa is known to be food secure, however, lately the level of food insecurity rates has risen in most parts of the country (Trefry, Parkins and Cundill, 2014). Without ruling out the safety net provided by government grants. It seems like they are not sufficient to cater for all the people's needs. Also, high food price is a major barrier to food security particularly to those living in poverty. Seemingly a participatory two-way learning approach that links both scientific knowledge and indigenous knowledge as stimulated in social learning operations can be an ideal intervention that can create some trade-offs and an integrated approach that can best benefit rural dwellers because it is two-way reciprocal strategy which can create an equilibrium that can benefit poor communities and remedy the situation of lack. Social learning is more than a participatory strategy, it embeds education which capacitate people towards accessing and promoting sustainable development (Davids and Theron, 2014). At the same time, it involves them in the identification and implementation of a solution to their challenges Fenster and Misgav (2014). Work Integrated Learning (WIL) in integrating communities and the university can be an enabler for social learning opportunities to enable engagement with communities to educate, exchange knowledge and skills as well as creating collaborations that can produce resilient, healthy communities who can manage personal barriers and cope with global complexities. It is within this backdrop that collaborative initiatives between the university and the community were formed to exchange knowledge and skills.

Literature Review

Within the quest to reduce poverty and food shortage along with the Sustainable Development Goals (SDG)s Higher Education Institutions (HEI)s need to play a leading role

in using curriculum to integrate principles of self-management, and management of resources for sustainability and for the survival of communities. Bell (2016) points out that the world population is increasing, and this has an impact on sustaining communities, therefore, education and management skills are greatly needed. The projection of population increases as posited by (Ibid) will reach a level of 9,7 billion by 2050.This brings a concern to all about the development of communities within the ambit of the Sustainable Development Goals (SDG)s to build capacity that can contribute towards reducing hunger and poverty. To that effect, higher institutions, and the broader community need to rethink ways of rebuilding communities to bring change. Freire (1970) indicates that poor communities need to think and understand their social conditions so that they can develop and overcome some of their barriers. Arguably, this means that within the educational and management discourse, the focus is to link knowledge with practical initiatives accompanied by knowledge and skills that will not only change communities thinking patterns but, to change and replace traits that do not yield productivity.

A multifaceted approach that embraces different stakeholders in establishing an educational foundation, and preparing people to acquire skills to enable them to cope with the changing world is needed. This makes social learning a relevant approach because it stimulates a deeper understanding between the learned with scholarly knowledge, and those who possess indigenous knowledge, who best understand their territory and their needs. It is thus prudent to co-construct, co-create, and share knowledge collectively with others to sustain humanity and restore a sense of identity (Wiziack et al., 2013). This brings the relevance of education and management skills in enabling communities to reciprocate knowledge and skills through active participation, teamwork and collective decision making. Yukawa (2015) recommends that communities must be prepared for the complexity and the problems arising from the world's adversities by employing learning transformation approaches. On the other hand, Kegan and Lahey (2016) points to collaborative efforts that are developmental, and practices where everyone is supported, where personal learning is targeted, where negative personal traits are identified, and strategies are devised to overcome them. This is the kind of learning which according to Freire's (1970) perspective, addresses people as a collective and for them to become critically literate about their circumstance. Since social learning does not confine communities to a mere passive participation but involves ownership of the process of development by communities as beneficiaries of development (Munzer and Shaw, 2015) it becomes a befitting intervention strategy to be used. This means that social learning can bring communities to a point of self-reflection and management of the environment through teamwork, active participation, and effective communication.

Social learning places an increasing demand in HEIs to promote education that does not leave communities behind but build a conscious society (Björkman, 2018). Thus, use is made of different mechanisms to embrace and capacitate communities to enable them to manage their lives and cope with challenges by applying management and sustainable principles (Peter and Wals, 2013). The implication is that communities are actively involved in the process of learning which involves an exchange of values and collaboration. Social learning thus serves as one of the elements of a participatory bottom-up approach which brings communities in the centre of development (Therron and Mchunu, 2014) to learn, manage, improve, and sustain their environment. Furthermore, the United Nations Educational, Scientific and Cultural Organization (UNESCO), have taken steps to promote a campaign that puts weight towards an increased recognition of the cognitive and socio-emotional features of learning about Sustainable Development Goals (SDG)s education (UNESCO, 2017). This can indirectly contribute towards the realisation of the link between education, food security and

poverty reduction. A major question around food security has been to capacitate and empower people to understand their potentials and believe in themselves that they can manage change. Notably, management skills that are applied in different organisations, companies or institutions are also applicable in the collaborative effort of changing needs of the community (Smit et al., 2011). In essence management principles fit anywhere. This means management skills such as planning, organisation, leading and control, communication, decision making, and interpersonal skills are in alignment to the social learning theory and can be applied and be used by individuals to manage themselves and resources to ensure survival and sustainability. According to Wamsler (2020) most of research findings revealed that research on sustainability and education concentrate more on external factors such as environmental aspects, socio-economic and governance issues rather also looking at inner personal challenges faced by individual community members. Nasibulina (2015) adds that education promotes lifelong learning which brings change in action and outlook towards life by laying the foundation of good morals, knowledge and skills enable communities to tackle complex problems in their development journey. To Brink and Wamsler (2019) engagement with others stimulate motivation and stimulate sensitivity and recognition for sustainable values.

Theoretical Framework

Social learning is a concept derived from Bandura (1977) learning theory as an adaptive management approach showing a change in understanding when a group of people learn from each other. According to (Bandura and Walters, 1977) learning is based on the observation of the behaviour of others including a form of social interaction within a group. Following (Bandura and Walters, 1977), such an interaction between people and the environment including other factors at their exposition influence the interchange of knowledge and skills, values, attitude, and the modelling of behavior to reciprocate and impact on transformation and educational development of people. Even though some of the negative elements demonstrated by others are not desirable, social learning can contribute towards the reshaping of good qualities and roles of different role players in the quest for development (Ibid). Green and Peil (2015) add that social learning is a theory which influences people's learning and development of certain traits whereas (Lave and Wenger, 1991) refers to it as an active social participation which reflect activities of a community in the process of learning and developing. It can thus be interpreted as a change resulting from educational foundation that is laid including the adoption of skills gained through interaction with others wherein people learn better traits and adopt new skills that can change their lives for the better. This implies that access to sound knowledge can lead towards producing better outcomes that educate and equip communities with knowledge and management skills that can instil desirable values and traits such as maturity, self-motivation, and self-management. Therefore, it becomes pertinent that, universities must engage and educate communities by laying foundational principles around sound traits, knowledge, and management skills using WIL to promote social learning.

Aim of the Study

The aim was to investigate the impact of social learning and education as facilitated through the Work Integrated Learning (WIL) module to help communities to thrive and secure food.

Research Objectives

1. To determine the extent to which education and social learning promote resilience and change in mindset.
2. To explore ways on how education can develop positive traits that contribute towards communities sustaining food.

Research Questions

1. Towards extent does education and social learning promote lifelong learning, personal development and change in mindset?
2. How can communities sustain food security through education, social learning, and management skills?

Methodology

Research Design

A qualitative research design, guided by an interpretive paradigm, was adopted. Through this paradigm, rich data were collected through a case study which is social sciences research and through a semi-structured interview schedule coded manually into themes (Devare, 2015; Creswell & Clarke, 2014).

Sample and Sampling

The population to which the study aimed at generalising its findings was limited to a sample of few purposefully selected cases, comprising of the Nog community, students, and lecturers.

Methods

To collect get rich qualitative data, use was made of a case study, and semi-structured interviews. According to Merriam and Tisdell (2016) a case study is an empirical inquiry that investigates a contemporary phenomenon in depth within a real-life context.

Case Description

Permission to do the study was sought. Data used in this study included a case of Nog community in the Free state province who together with students and lecturers were part of an educational and social learning session aimed at making participants lifelong learners who can use their land resources to produce food. Log is a rural area in the Free state province and has a small population of plus or minus sixty households. There is no school, no transport and learners must walk many kilometres to a nearby school at a nearby small town, and during rainy days or adverse weather conditions they do not go to school. The university through the office of the Community Engagement in collaboration with lecturers and students initiated an educative empowering social learning session for the Log community. Although the Log community has a vast land with the opportunity of planting and little resources but most of the members were idling, lost hope, negative, uncooperative, lack motivation and management skills. The first session was held in the university where lecturers, students and community members collaborated and learned together. The session was facilitated by lecturers and students were helping community members in interpreting certain difficult words in their mother tongue language and both students and lecturers seated together with community members in each table. The session was a conglomeration of an educational

information, personal skills, management skills and soft skills on problem solving, teamwork, human rights including participatory and sustainability principles.

After an introductory theory all the participants were given themes in groups to identify, discuss and reflect on them, followed by the identification of each one's strength and weaknesses. The session paved the way for the unlearning of undesirable traits and the learning of desirable ones to bring awareness and to help participants to identify resources they have and solve some of their barriers. In practising social learning principles, the first session was about sharing of ideas and best practices. The second session was about the formation of teams consisting of community members and one lecturer. It was followed by the third session which was hosted in the community big storage where they place their farming equipment to undertake a practical work and reflecting further on the application of what was learned which the community had to do independently and reflect orally and in a written form. The last session was the submission of files which included reflections and a some of the practical activities that communities undertook accompanied by photos. Vu and Feinstein (2017) posit that reflective writing within qualitative research qualifies as a data source tool which becomes part of the analytical processes. At the end of the four consecutive sessions there were positive outcomes that emerged such as a motivated community, change of behavioural patterns and a community that was willing to work diligently, produce food and sustain themselves. After completion of all the sessions certificates were issued, follow-ups, monitoring and support were also done by lecturers and students.

Data Analysis
Data were recorded, transcribed, and analysed systematically from content to codes, patterns and to emerging themes using content analysis (Creswell and Poth, 2016). Data used in this study included interviews, oral and written reflections of participants indicating personal development, adoption of new traits. change in outlook towards life and management skills.

Ethical Considerations
In the process of data collection participants were treated with respect, dignity, and sensitivity and were informed of the confidentiality and anonymity of the process.

Findings and Discussions

The findings revealed that through social learning different groups can work together, help each other, and share knowledge and skills that inspire mindset change.

"*Social learning sessions motivated me to remove false beliefs to embrace the belief that I can change my situation for the better,*" said one of the participants.

This reveals the importance of education in laying foundational principles and values that help people to manage their personal lives and their situation of lack. As indicated by (cf. Brink and Wamsler, 2019) motivation is an intrinsic attribute which stimulate positive and sound traits values needed for healthy living and sustainable living. This further   validate Bandura (1977) learning theory as an adaptive management approach that brings a change in understanding when a group of people learn from each other.

"Social learning educational sessions opened a reciprocal process of lifelong learning which considers the significance of different types of knowledge", reported one of the participants.

This reveals the significance of creating a broader space for knowledge sharing that embraces a bottom-up participatory approach where both communities, students and lecturers were operating as equal partners and were free to work on their weaknesses and build their strengths towards using the resources at their disposable to grow food. According to (cf. Brink and Wamsler, 2019) engagement with others stimulate motivation and awareness of good practices and sound values. The idea articulated by (Wiziack et al., 2013) becomes relevant here in making social learning a tool to be used to acquire knowledge and skills that inspire people to realise the importance of food security and sustainability as one of the goals of sessions held the Nog community.

The case study showed that poverty, and unemployment brought low morale which made people to be motivated and not idle. However, the learning session, whereby ideas were shared, help and support given by lecturers ignited hope, positivity, responsibility, activism, and the realisation by the Nog community to use their land as a valuable resource to plough food to reduce poverty and lack. According to (cf. Freire, 1970) the assertion is that the poor must have an understanding about their social conditions to be able to work on some of the weaknesses and overcome some barriers. Similarly, (cf. Yukawa, 2015) recommends that communities must be prepared for the complexity and the problems arising from the world's adversities by employing learning transformation approaches.

Another participant added that, *"Learning together and reflecting on outcomes about managing weaknesses contributed to my personal development and the ability to use resources we have to produce food and live healthy".*

Reflections revealed that, "Time management, planning and setting of objectives helped participants to improve on their weaknesses and build on their strengths.

"Discussions emanating from the educational sessions brought a whole new level of enlightenment of that made me to start planning, setting goals and started having interest in growing food and using resources at my disposable sustainably", reflected.

Another participant, whilst another said, *"Working on my weaknesses and building on my strengths made me to become resilient and to think of ways of improving my life and that of others".*

This suggest that education and social learning are supportive process that can stimulates individuals' interest to change their perspective about life, to become lifelong learners who build new habits and values.

"I also learned that not only western education matters but there is also wealth of knowledge that comes from indigenous knowledge", said another participant.

This showed the value of each knowledge type and values that are embraced within each knowledge type that society can tap into to develop healthy traits that lead to progress and sustainability.

Another participant said, *"Social learning sessions made me to realise that I can cope with complexities".*

This suggests that education and motivation enrich individuals with sound values and principles that enable communities to rise from poverty mindsets and handle complexities.

Another discovery was that management techniques such as planning, time management, motivation, decision making, conflict management that arose from the sharing of management skills motivated many people to join hands in the project of growing and selling food to sustain themselves, move out of the poverty trap and sustain a healthy lifestyle.

The case study and reflections further revealed the importance of education in contributing towards personal development. The view is supported by (cf. Nasibulina, 2015) who indicates that education promotes lifelong learning by laying the foundation of sound virtues, knowledge, and skills. Also revealed was the idea that social learning sessions stimulated self-belief and trust in one's abilities and change people's perspectives from being mere consumers to producers. This suggests that education and shared knowledge around issues of sustainability and management help to build a transformed society that is driven by sound knowledge and skills as well as building resilient communities who turns into producers that are involved in the food security drive. A critical finding was the significant relationship between education, management, and social learning which made people to move out of their comfort zones but to think of ways of dealing with their situation of lack and destitute.

Conclusion

It is evident that education, social learning, and motivation plays a significant role in broadening people's knowledge and bringing change in mindset to focus on strengths and work on their weaknesses to sustain their lives. Social learning laid the foundation for the survival of communities and for them to unlearn and learn traits and techniques that contributes towards better standards of living. This paper investigated how social learning and education promote lifelong learning and contribute towards a stimulus for self-management skills to change negative behavioral traits and practices. Education self-management skills and motivation forms part of lifelong learning contributing to personal development and the ability to use resources effectively and secure food because communities with sound values and an educational foundation are likely to be food secure than those without. This paper concludes that HEIs engagement with communities though the WIL module should follow strategies that do not subscribe to passive participation. Rather, they must engage in reflective, participatory social learning initiatives that motivate people to change their mindsets and gather knowledge and skills that enable them to manage their personal lives and resources. Knowledge and skills that were shared through WIL activities and a social learning approach where people shared knowledge and skills on an equal basis platform enabled a sense of taking charge, independence, responsibility, and the will to live better. It is thus concluded that social learning and education can bring positive results of self-management and sustainable living that can change a society from a downturn and collapse to an informed, a healthy resilient society that is able to secure food and reduce poverty.

Implications

The implication is that social learning allows equal status and recognition of different knowledge types. This is indicative of recognition of human centred approaches and the creation of balance between scientific and indigenous knowledge significant in developing informed, resilient, and a healthy society that can survive the onslaught of food security and poverty to decrease dependency on government with its limited resources in servicing a

growing population. Higher Education thus needs to use Work Integrated Learning (WIL) as an enabler for community engagement in the curriculum, to equip communities with knowledge and skills to be able to manage food security and poverty. This study proposes an ongoing educational support and engagement between higher education and communities with the implication of bringing change and sustaining communities. Since government cannot curb the increasing population and cater for their increased needs. It becomes mandatory for higher education to engage with communities and assist with continuous capacity building, whilst government provides agricultural resources.

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Mentoring to Enhance Student Teachers' Self-Efficacy for E-portfolio Development During Teaching Practice

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Abstract

Teaching Practice is a critical phase of teacher education that provides opportunities for student teachers to reflect on the development of their teaching philosophies and put them into action. Student teachers' self-efficacy refers to their beliefs in their ability to effectively handle the tasks, obligations, and challenges related to their professional activity. In the South African context, e-portfolios are increasingly being considered in teacher training programs to enable student teachers to reflect in, on and about practice in a structured way, whereby they demonstrate their growth and development as professionals. Good quality mentoring during teaching practice contributes to the development of critical professional skills of student teachers and ensures the best quality learning experiences for pupils. This paper is arranged as an ideas paper that seeks to explore how mentoring may enhance student teachers self-efficacy for e-portfolio development during teaching practice. A qualitative research design was adopted in gathering information used for this study. A literature review process was used as a data collection tool and this involved activities such as identifying, recording, understanding, meaning-making, and transmitting information pertinent to the enhancement of student teachers self-efficacy for e-portfolio development during teaching practice through mentoring. Findings revealed that good quality mentoring may enhance the student teachers' self-efficacy for e-portfolio development and that e-portfolios are practical tools for self-directed, reflective and collaborative professional learning. Further findings show that formal mentoring programs are essential to meet student teachers professional learning needs. These findings will encourage mentor teachers to optimally assist student teachers to develop e-portfolios for their professional learning.

Keywords: Mentoring, Self-Efficacy, E-portfolios Development

Introduction

Teaching practice is an integral feature of any education-based program. During this period student teachers are afforded an opportunity to develop and refine teaching competency, expertise and quality. They practice how to plan and deliver content, how to asses learners, how to engage their learners in the learning process, and also how to reflect on their teaching experience. During this time student teachers are expected to develop electronic portfolios, also known as e-portfolios. These e-portfolios succeeded paper-based portfolios. E-Portfolios generally refer to "digital dossiers, in which students compile and reflect upon multimodal artefacts to review their learning journeys" (Yancey, 2019).

During teaching practice, student teachers are assigned mentor teachers whose duties are crucial in helping pre-service teachers hone their pedagogical abilities and grow as professionals in the classroom (Li, Sani & Azmin, 2021). Mentoring, in a pre-service teacher context, occurs during professional placements (or practicum) in which student teachers are being placed with classroom teachers (mentor teachers) to learn, develop and practise teaching knowledge and skills (The Queensland College of Teachers, 2007).

The Mentoring Context in Pre-service Teacher Education

During teaching practice student teachers attend schools to have a real life professional experience and develop their teaching skills under close supervision of expert mentor teachers. Ambrosetti (2014:31) argues that mentoring "concerns the development of the relationship between the mentor and mentee, which in turn provides the underpinning for the growth of the mentee's skills". In order to assume the tasks of welcoming, accompaniment, and direction in the dynamic engagement of the placement school or classroom and the student evaluation, the mentor teacher must have the necessary knowledge, leadership, and interpersonal skills (Fernamdez-Morante, Leranoz-Iglesias, Cabriero-Lopez & Abel-Pereira, 2024:2).

When mentoring pre-service teachers during their teaching practicum, mentor teachers must always act out their roles. They are expected to be role models as experienced professionals who demonstrate best practice for the student teachers to emulate.

The Teaching Practicum

Teaching practice, often called teaching practicum, involves learners, school administrators, mentor teachers, university supervisors, and student teachers. It is a mandatory course in teacher education programs that works with schools to try and acquaint student teachers with the teaching environment and its variables (Aghabarari & Rahimi, 2020:2). According to Aglozar (2017), the following sets of objectives have been established for why teaching practice is a mandatory component of teacher training: "to expose student-teachers to real life classroom experiences under the supervision of professional teachers; to provide the forum for student-teacher to translate educational theories and principles into practice; to enable student-teachers discover their own strengths and weaknesses in classroom teaching and provide opportunities to enable them address their weaknesses and enrich their strengths; to familiarize student-teachers with real school environment as their future work place; to provide student-teachers with an opportunity for further acquisition of professional skills, competencies, personal characteristics and experience for full-time teaching after graduation; to help student-teachers develop a positive attitude towards the teaching profession; and to

serve as a means of assessing the quality of training being provided by teacher training institutions" (102).

Teaching practice is also aimed at closing the gap between theory and professional practice. Mesa (2018:303) defines professional practice as "a range of opportunities for observation, analysis, and interpretation of what happens, how and when it happens in teaching situations, as well as experimentation in real contexts". Theory, on the other hand, is defined as "the knowledge needed to handle professional activities". In this sense, the placement schools effectively contextualize, apply, and reconstruct information for use in the classroom while the university disseminates knowledge through its teaching staff in the teaching professions that are mobilized in the programs of teacher education (Mesa 2018:303).

Teaching practice is designed to improve student teachers' ability to teach by providing them with the opportunity to apply the knowledge, beliefs, and skills they have been studying at the university (Badawi, 2021:692).Thus, teaching practicum gives student-teachers a chance to have contact with the real world of their profession. The content of teaching practicum therefore helps student teachers get acquainted with educational practice, practice the work of a class teacher, practice teaching and prepare final a portfolio of evidence for both developmental and assessment purposes.

The E-portfolio

An e-portfolio can be defined as a digitized collection of artifacts including demonstrations, resources, and accomplishments that represent an individual, group or institution. Using ePortfolios in teacher education programs has a number of benefits. Among these benefits include improved pedagogical and technical topic knowledge, reflective teaching abilities, values, beliefs, and positive attitudes, as well as improved lifelong learning (Thabane, 2022). In teacher education programs, e-portfolios are employed as instruments for reflection and empowerment. Pre-service teachers stand to gain the most from the usage of e-portfolios in the development of their reflective competences. A crucial component of a teacher's professional development is reflection. The e-portfolio captures the learning process itself because the student's progress can be monitored along the way . It also allows the exchange of ideas and feedback (López-Crespo1, Carmen Blanco-Gandía1, Valdivia-Salas, Fidalgoi & Sánchez-Pérez, 2022:5234). An e-portfolio therefore showcases a student teacher's personal growth and demonstrate specific knowledge and skills gained during the learning programme. This means that student teachers use the ePortfolio to reflect, engage, collaborate and enhance active, authentic learning. E-portfolios therefore provide a comprehensive way to document personal progress, to reflect on work activities, to support learning and to serve as a tool for feedback and evaluation (Totter & Wyss, 2019).

E-portfolios provide student teachers with an opportunity and a virtual space to critically assess their academic work through reflection. Student teachers use e-portfolios to provide evidence of competencies required for certification (Lorenzo & Ittelson, 2005:4). Student teachers are also able to make connections among different activities undertaken during teaching practice through the use of e-portfolios. Student teachers can benefit from e-portfolios in a number of ways, including the opportunity to incorporate multimedia, ubiquitus portfolio access, and an easier way to view their own development (Beckers, Dolmans, & Merrenboer, 2016).

The E-portfolio Development

Developing an e-portfolio involves skills essential for the 21st century learning such as organizing and planning material, giving and receiving feedback, reflecting, selecting and arranging content to communicate with others in a more effective way. E-portfolios help student teachers grow by encouraging continuous self-evaluation through reflection on their own strengths and weaknesses, identification of knowledge and competency gaps, celebration of accomplishments, assessment of future directions, and conversation with others (JISC, 2008).

Student teachers' experiences during teaching practice have a significant impact on their subsequent integration of technology upon entering the field. With the assistance of mentor teachers, student teachers become empowered to develop e-portfolios. Student teachers are assisted in technology integration. During this process student teachers are provided with knowledge on how to utilize content and technological and pedagogical expertise effectively for the benefit of pupils' learning (Hodges, 2018). The creation and management of an e-portfolio provides student teachers with opportunities to build digital fluency, using technologies to create, select, organise, edit, and evaluate their work.

Self-Efficacy in E-portfolio Development

Self-efficacy is built upon the tenets associated with Bandura's (1986) Social Cognitive Theory (SCT). SCT defines self-efficacy as people's judgement of their capabilities to organize and execute courses of action required to attain designated types of performance. During teaching practice student teachers are required to develop e-portfolios to demonstrate their capabilities to organize their teaching to benefit pupils' learning. Although electronic portfolios have numerous potential advantages, the process of constructing one involves several processes, such as gathering, choosing, reflecting, projecting/directing, and displaying (Yang & Wu, 2013:121). Unfocused instruction and/or poorly defined tasks result in low reliability for evaluations in portfolio assessment; the electronic portfolio requires a level of technological skill that not all teachers and students possess; it takes time for students to put together and for teachers to guide and provide feedback.

Method

The research issue in this paper is addressed through a critical literature evaluation on the role of mentoring in enhancing student teachers' self-efficacy in e-portfolio development, a task that student teachers are required to undertake since the start of the covid-19 pandemic going forward. A literature review process helped in identifying, recording, understanding, meaning-making, and transmitting information pertinent to the enhancement of student teachers self-efficacy for e-portfolio development during teaching practice through mentoring.

Discussion and Conclusions

Mentoring student teachers in developing e-portfolios provides a strong link between knowledge of theory and teaching practices with technology embedded. When technology, content and pedagogy are simultaneously considered, student teachers are more effective in responding to challenges in technology and can engage in reflective practice (Hodges, 2018).

As alluded to by Yang and Wu (2013:167), developing an electronic portfolio is quite challenging in practice. However, Syzdykova, Koblandin, Mikhaylova, and Akinina (2021:121) maintain that it is also important to provide technical support to students and teachers as it can significantly affect student motivation and their perception of e-portfolios.This technical support is best provided by the mentor teacher. Student comfort when using the e-portfolio technology is also an important aspect of motivation. Intrinsic motivation is the key to the acceptance of new technologies, and self-efficacy (competency) is a prerequisite for motivation. It is noted that problems with the IT infrastructure and the system used to create an e-portfolio negatively affect student motivation (Syzdykova, *et al*, 2021).

Student teachers usually hold their mentor teachers in high regard. The involvement of mentor teachers in the student teacher's activitities brings about hope and a wilingness to succeed, hence their believe to succeed in developing an e-portfolio is enhanced by the mentoring they receive.Mentor teachers carefully considered their students' design layouts and included materials after exploring the elements and the structures of some existing examples. Difficulties with integrating multimedia are more prevalent when schools do not provide predefined formats (Hsieh, Lee, & Chen, 2015).

Self-efficacy beliefs among new teachers have an impact on their levels of drive and tenacity in the face of challenges. Often, these teachers want to engage more and be autonomous, but experience limited support from their school management teams (Mokone, Palmer & Thabane, 2022). Self-efficacy is a powerful motivator that helps people decide how much work is necessary (Alexiou & Paraskeva, 2013). The mentor teacher needs to ensure that the student teacher spends sufficient time and effort in the development of an e-portfolio so as to realize self-improvement. Mentor teachers may enhance the student teachers' self-efficacy to develop an e-portfolio by helping to identify helpful resources that student teachers may access to develop their e-portfolios. Mentor teachers should foster meaningful dialogues between themselves and the student teachers. These dialogues should encourage exploration as thereby leading to deep learning.

Reflection as a process of making sense of ideas and concepts in relation to our existing knowledge structure and our feelings is a crucial aspect of e-portfolio development. Student teachers are unlikely to reflect successfully without considerable guidance from the mentor teacher. Therefore, in order to properly help the student teachers during their placements in schools, the university must make sure that mentor teachers are aware of their responsibilities. From the above trends in literature it may be concluded that good quality mentoring can enhance the self-efficacy of student teachers in the development of e-portfolios.

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The Impact of Interaction via Social Media on Youth Mental Health Through Social Media Content and Communication Style of Indonesian Students

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Abstract
During the COVID-19 pandemic most of students globally suffered of mental health. Bisedes virus wudespread, communication and interaction pattern on social media also play important role on their mental disorder including anxiety, depression, and mood disorders. It needs to confirm which content and interactions influence students and youth behavior. Methods: A total of 604 valid participant which obtain through online survey, aged 15-25 years at beseline. Structural Equation Modelling (SEM) was used to examine research hypotheses. Results: Social media interaction pattern has positive and significant effect on which content student discuss and sharem as well as their communication style. Furthermore, communication style has greater effect on student mental health than social content. Conclusions: the interaction of baseline students' emotional features with social media environment predicted divergent of social communication and interaction on social media. Both anxiety and depression from social influenced by communication and interaction pattern. Results: the results indicate that the main motivator of students in this context is the effectiveness and convenience of using social media, particularly in the use of content and communication with the determination of individuals and student communities. One way to predict the widespread of social media interaction options is to examine the motivation for using it individually, socially, and within the context of the student's environment. According to the findings, mental health is more particular, and choosing to participate in social media interactions is what drives students in these situations.

Keywords: Social Media Interactions, Social Media Content, Communication Style, Youth Mental Health

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Introduction

The COVID-19 pandemic has caused significant changes in various areas of life, including education. Two years since the beginning of 2020, the public has been shocked by the outbreak of the COVID-19, which changed almost all human behaviors, such as the implementation of online learning, teacher-student and student-student communication taking place in social media groups, as well as assignments submission, and many other educational activities carried out online (Adedoyin & Soykan, 2020; Aristeidou & Cross, 2021). Several countries such as India, Africa, and the United States have been actively using social media to communicate during the COVID-19 pandemic (Adekoya & Fasae, 2021; Bordoloi et al., 2021; Kemp, 2020; Madge et al., 2019; Sharma & Kapoor, 2021), thereby increasing the number of active users (Mason et al., 2021). Apart from India and America, Indonesia has the third highest number of social media users worldwide, precisely 191 million people. In this regard, the COVID-19 pandemic has undoubtedly promoted student communication on social media, including creating learning communities in *WhatsApp*, *Facebook*, and *Instagram*, which made these platforms very popular among Indonesian students (Statista, 2022).

The restrictions on direct communication through conventional methos do not prevent learners from actively communicating and interacting, considering that using social media has become their daily habit (Sims et al., 2017; Zarzycka et al., 2021). As the focal point of long-distance communication, social media facilitates the exchange of information, knowledge, and daily activities that positively affect pupils' boredom while at home (Boyd & Ellison, 2007; Haand & Shuwang, 2020; Lin & Lu, 2011). Hence, such behavior occurs all the time and eventually becomes a daily routine (Kemp, 2020; Shen, 2020). In addition, remote or long-distance communication is compatible with the existing methods and technologies, enabling it to run effectively. It expands interactions outside the home and school and eliminates the limitations of distance and space encountered in conventional or direct interaction (Kemp, 2020). Nonetheless, these two methods should ideally be applied simultaneously to promote the dissemination of information and knowledge along with other activities.

Students seem to feel comfortable communicating on social media due to several factors such as fascinating content (sounds, images, texts, and videos), learning needs, entertainment, opportunities to share experiences, and daily communication (Boyd & Ellison, 2007; Lin & Lu, 2011). However, there were limited studies investigating the impact of active communication on social media on learners' mental health, either in a positive or negative context. Researchers argue that students' familiarity with social media might affect their mental health based on previous studies (Baccarella et al., 2018; Glazzard & Stones, 2016; Hou et al., 2019), changes in learning behaviors, communication at home, and decreased social awareness.

Some learners spend time interacting on social media all day without getting bored because of the variety of impressive content found on each social media platform (Ralph et al., 2022; Vraga et al., 2016; Zarzycka et al., 2021). For instance, *Facebook* provides many features such as storytelling, live broadcasts, instant article publishing, and a communication space (Bene et al., 2022; Bergström & Belfrage, 2018). *Instagram* offers quiz and giveaway content, regular posts, reels, and chat rooms (Voorveld et al., 2018). *WhatsApp* presents a simpler communication space, story-sharing feature, and a more effective learning group or community (Madge et al., 2019). In sharing or responding to content, each student has a different communication style, such as being self-centered by focusing on prominent issues,

commenting on posts positively and negatively, or simply sending *emoticons* and pressing the *like* or *unlike* button (Bene et al., 2022; Keller & Kleinen-von Königslöw, 2018).

Social media can be benefitted as a learning community (Madge et al., 2019; Zarzycka et al., 2021), a place for social interaction/daily communication (Bergström & Belfrage, 2018; Mason et al., 2021; Papoola, 2014), entertainment (Lin & Lu, 2011), and professional or work purposes (Boddy & Dominelli, 2016). In educational institutions, students and teachers have used social media to exchange knowledge, discuss, and share information (Madge et al., 2019). In the present study, researchers focused on *WhatsApp*, *Facebook*, and *Instagram*, as the most popular platforms, especially in Indonesia (Data Indonesia, 2022).

Daily interaction plays a crucial role in improving the quality of human life, one of which is the education process for students. Accordingly, scholars must explore the correlation between elements of daily communication (such as interaction on social media, content availability, communication style, and mental health) with students, teachers, and society by engaging various indicators. Pupils carried out two types of interactions: direct and indirect (First et al., 2020; Namkoong et al., 2016). In an indirect interaction, the use of social media likely motivates people to access the existing platforms frequently for a long time, resulting in a sort of addiction (Haand & Shuwang, 2020; Hilliard, 2019). Several empirical studies concluded that social media interactions correlated with content, communication style, and mental health (Glazzard & Stones, 2016; Hou et al., 2019; Vraga et al., 2016). In the context of student interaction, the discovered patterns included positive or negative communication, level of concern, and motivating content covering education, religion, and entertainment.

Anchored on previous study findings, Indonesia encountered a particular case in the form of students' mental health conditions affecting their interactions in life. Although mental health was investigated frequently, researchers still have not discovered the main problems and solutions, making the topic remain a polemic and a common issue. In addition, prior studies only focused on the existence of social media, the effectiveness of communication on social media, and mental health (Bergström & Belfrage, 2018; Haand & Shuwang, 2020; Kumar & Nayar, 2020), which oriented to the context of western countries and neglected the comprehensive concept of social media interaction such as variations in content and communication styles (Hilliard, 2019). Furthermore, (de Vries et al., 2017; Gambo & Musonda, 2022; Sajtos et al., 2022) suggested future studies to conduct an in-depth investigation of the impact of interactions via social media on students' mental health based on the context of eastern countries and education. Therefore, the present research aims to address the following questions:

RQ1. Does interaction via social media affect students' mental health?
RQ2. Does interaction via social media have a positive impact on social media content and communication style?
RQ3. Do mediating roles of social media content and communication style have a positive impact on students' mental health?

In an effort to answer the research questions, researchers examined the impact of students' active interactions via social media on their mental health in education by incorporating content and communication style as mediating variables. Therefore, this study was expected to provide some theoretical and practical contributions. *First*, this research correlated student interactions via social media, such as using learning groups in schools, organizations, and other communities through *WhatsApp*, *Facebook*, and *Instagram*. *Second*, previous scholars discussing the correlation between content and interaction on social media did not concern

the communication style and students' mental health conditions (Achen, 2019; Choi & Shin, 2016; Yuan & Lou, 2020). In the context of this study, both mediators and interaction were associated with content and communication style (Keller & Kleinen-von Königslöw, 2018; Vraga et al., 2016). Hence, it could assist academics and practitioners in comprehending the impact of interaction via social media on students' mental health, which further affected the content and communication styles that had an impact on psychological conditions such as positive or negative mental health.

Literature & Hypotheses

Social Media Interactions

The frequency of social media interactions among the public is increasing, particularly among teenagers/students. Increased social media interaction can be used as important research to determine its effect on students' conditions such as the impact of students' interactions with parents, teachers, friends, and other communities (Abar et al., 2017; Cunha et al., 2016; Miao et al., 2022). Several previous studies have focused on the use of social media as media of interaction that facilitate human activities such as daily communication processes, learning, buying and selling products, work meetings, and entertainment (Lin & Lu, 2011; Sims et al., 2017; Zarzycka et al., 2021). This is the time to know and pay attention to the students' condition during interactions on social media. Thus, this study provides important information about students' interactions on social media that have an impact on their mental health. There are several students' interaction media, such as WhatsApp, that help students form subject groups, schoolwork groups, discussion groups, communities both inside and outside of the school (social groups), and family groups (Madge et al., 2019; Lakmali et al., 2021). Facebook as interaction media function as a larger communication space for conveying and discovering information (such as education, politics, health, and social), and live streaming content to the world (Bene et al., 2022; Bergström & Belfrage, 2018; Ralph et al., 2022; Vraga et al., 2016; Zarzycka et al., 2021). Furthermore, as the popular interaction media among students, Instagram can provide entertainment such as quiz content, giveaways, reels content, chat rooms, regular post content, and a more flexible community among students (Voorveld et al., 2018). These three social media provide distinct platforms and have the appeal to be used on daily basis in the interaction space (Alaimo & Kallinikos, 2017). Interactions in social media will have an impact on students' mental health, such as positive or negative impacts (A. et al., 2022; Keles et al., 2020). In this study, interactions in social media were mediated by the provision of social media content and students' communication styles, which are expected to aid researchers in determining students' mental health conditions during interactions in social media.

Social Media Content

Social media content attracts students' attention to continue interacting. Therefore, they are becoming accustomed to using or sharing content on social media (Tang et al., 2012; Dedeoglu, 2019). Students consider social media content can meet their needs such as communication, entertainment (sharing reels, routines, watching live streaming videos, reading news about culture, food, movies, fashion, and so on), making it easier for learning communities, social communities, saving photo/video documents, looking for job opportunities, and utilizing social media content to earn money or work (Bergström & Belfrage, 2018; Kemp, 2020; Lin & Lu, 2011). In addition, students demonstrate their ability in creating content, such as videos, images, text, and other audio-visuals, and share them on

social media. This study focuses on social media content that affects students' mental health when they create or receive content such as written or text content, images, and audio-visual/video on WhatsApp, Facebook, and Instagram spaces (Kaushal & Dogra, 2021). Social media content will make a significant contribution to students' interactions in social media and positive mental health. According to (Thorsen & Jackson, 2018; Welbers & Opgenhaffen, 2018), the types of written content are in the form of copywriting, short stories, poems, promotional texts, email content, e-books, news texts, narrative texts, and writings for daily communication. Another type of content is image-based content (Alam et al., 2018; Bossio, 2021). Images are two-dimensional arts with the function to explain something, examples of image-based content are photos, memes, flyers, banners, and infographics. Furthermore, audio-visual content, such as voice notes, music, and streaming platforms, is popular among students; all of these contents can be shared easily on social media (Figueroa, 2008). Students can capture information more structuredly by using written, image-based, and audiovisual content (Pearce et al., 2018). Every student can create and select content she/he likes or even uses all of the content available in social media. Finally, content in social media will become a benchmark for students' mental health.

Communication Style

The presence of social media among students affects their communication style used to interact, convey aspirations, inspiration, and receive information. Social media is not new among students, but its usage has increased since the COVID-19 pandemic until now (Mason et al., 2021). Therefore, it is appropriate for academics, practitioners, government, or parents to know the communication style used by students in social media (Cunha et al., 2016; Zarzycka et al., 2021) to help students' mental health. Communication styles will provide new experiences to students, such as oral/verbal communication (talking directly by voice), written (replying to messages via text or commenting on posts via written text), and non-verbal communication, such as commenting on images, videos, stickers, emotions, or tapping like/unlike button (Bene et al., 2022; Keller & Kleinen-von Königslöw, 2018). In addition, the communication style used is formal, such as in learning groups with teachers, attending seminars, or meetings in a specific organization, and social media users use a standard/ formal language style when communicating important/formal information, (Welbers & Opgenhaffen, 2018). Meanwhile, non-formal communication styles are used for daily communication with family, friends, close friends, or social communities, this is a well-known and relaxed communication style (Bullock & Hubner, 2020; Venter, 2017). The various communication styles can have an impact on the productivity or interaction of social media use. Thus, social media content and communication styles are key factors in discovering students' mental health during social media use, such as happiness, self-confidence, addiction, depression, anxiety, and positive and negative mental health (Glazzard & Stones, 2016; Keller & Kleinen-von Königslöw, 2018; Vraga et al., 2016). In conclusion, those key factors function to find out the success of interactions in social media that have a positive impact on students' mental health in the future.

Youth Mental Health

Mental health is an inner state that can influence daily interactions whether it is in good or bad health. Students with positive mental health are calm and tranquility, so they enjoy life and appreciate those around them. Students who are mentally healthy exhibit characteristics, such as maximizing their potential in facing life's challenges, and establishing positiverelationships with family, teachers, friends, communities, andrelatives (Klineberg et

al., 2006; Maulik et al., 2011) particularly relationships or interactions in social media. On the other hand, students with mental health disorders experience impaired thoughts, moods, and emotional control leading to bad behavior (Ferrer & Mendes, 2017). Negative mental health damages interactions or relationships with others and reduces learning achievement and work productivity (Bergström & Belfrage, 2018). Examples of common mental health disorders that often occur in students are stress, anxiety disorders, anddepression (Keles et al., 2020). Some activities that can affect positive mental health are social/religious communities, worship/prayer, interaction or closeness with family, forming charitable communities in social media, public creative spaces, and sharing positive posts about various knowledge and learning (Cook 2020; Lakmali et al., 2021). In addition, an activity that can influence negative mental health is FOMO (Fears of Missing Out), which is one of the effects of frequent use of social media. FOMO refers to the fear of missing out on information or an opportunity to interact. Students who are addicted to social media will experience stress, which will negatively impact their mental health (Haand & Shuwang, 2020; Hilliard, 2019), and they will become emotionally attached to social media.
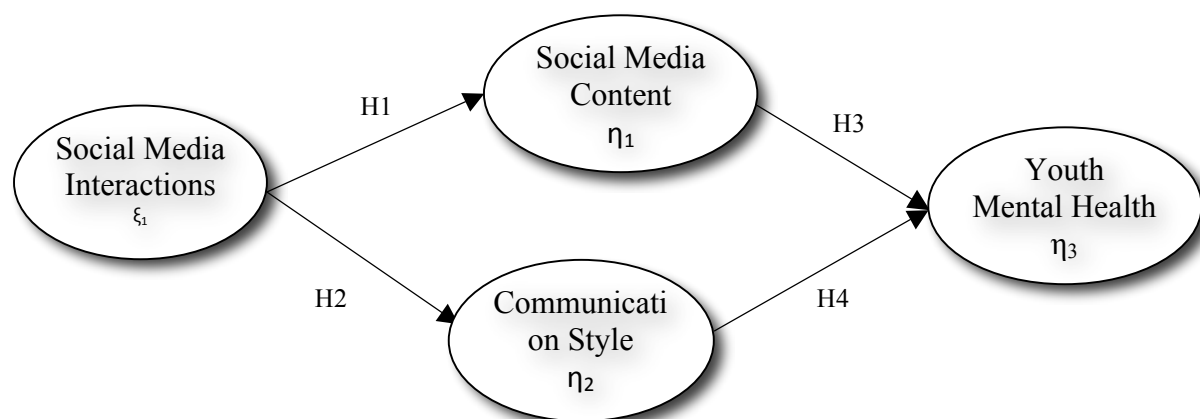

Figure 1: Proposed research model.

Methodology

Questionnaire Design, Pretest, and Pilot Study

This study adopts scales with high reliability and validity. It uses multi-item scales for all of the constructs from prior studies in the proposed model about conducting a pretest and pilot test to validate the measurement items' wordings of constructs for the social media content, communication style and youth mental health in Indonesia. It was used to ascertain whether the students understood each of the questions and revised wordings to prevent single-source bias (Podsakoff et al., 2003).

Sample and Data Collection

Indonesian students are asked to fill out an online survey; in addition, a cash prize of 2,000 Indonesian rupiah (IDR) must complete each study to increase their response rate. This online survey was conducted using Google Forms and samples were collected from convenience sampling at random. This study validates the relationship between social media content, communication style, and youth mental health.

Data Analysis

The data were analyzed using two statistical programs, namely SPSS 22 and AMOS 22 software. Furthermore, hypothesis testing was carried out by applying the structural equation model (SEM). According to Byrne (2016), SEM provides two essential aspects of the procedure. First, it is used to determine the causal effects of the observed variables, and (b) the structural relations among variables enable a clear description of the theory examined in this study. The hypothesized model is comprehensively used to validate all the variables to determine consistency with the study. Pearson correlation coefficients were also used to determine the relationship between predictors (social media interactions, social media content, and communicattion style) and criterion variables (youth mental health). Third, standard method variance (CMV) was adopted as a prevention and post-detection technique. Therefore, this study applies the Hayes bootstrap method (2018) to examine the influence of social media content and communication style on mental health mediated by social media interactions.

Results

The Pilot Study and Descriptive Statistic

This study conducted a measurement model by adopting AMOS software with maximum likelihood estimation. The model's fit indicated how well the CFA model reproduced the covariance matrix of the variable which was observed as seen in table 3. Each item loads significantly on its respective construct with factor loadings and squared multiple correlations of all measurement items and demonstrates good reliability for all item measurements, constructs, and convergent validity (Byrne, 2016). The mean score for the endogenous variable (Youth Mental Health) was above 3.00, while the standard deviation was above 0.70. This means that on average, social media content, communication style, social media interactions, and youth mental health had a strong correlation (table 2). The samples taken were 606 students and all samples were valid (see table.1).

Table 1: *Respondent Demographics*

Demographic Items	Frequency	Percentage (%)
Gender		
Male	184	30.4
Female	422	69.6
Age		
Below 20 years old	439	72.4
21~25 years old	167	27.6
Time range use social media		
1~5 year	285	47.0
6~10 Year	230	38.0
> 10 Year	91	15.0
Rang time use SNS in a day		
1~5 hours	248	40.9
6~10 hours	223	36.8
11~15 hours	90	14.9
➢ 15	45	7.4

Pearson Correlation

The pilot study was adopted to ascertain the content validity and respondents' identity; moreover, the reliability of measurement items was assessed using Cronbach's alpha (Hair Jr et al., 2019). The mean difference was indicated in the standard deviation. Therefore, an effect size greater than 3 indicated that the mean difference was half of the standard deviation. The mean score for all was above 5.00, while the standard deviation was below 1.00. It means that all observed variables had a strong correlation.

Table 2: *Correlation Matrix for Measurement Scales*

Constructs	Mean		SI	SMC	CS	MH
SI	4.11	0.63	**0.780**			
SMC	3.80	0.64	0.625**	**0.766**		
CS	3.77	0.70	0.479**	0.501**	**0.769**	
MH	3.02	0.80	0.131**	0.183**	0.263**	**0.728**

Note. SI: Social Media Interactions
SMC: Social Media Content
CS: Communication Style
MH: Youth Mental Health
SD: Standard Deviation
Diagonal elements are the square roots of the AVE for each construct
Pearson correlations are shown below the diagonal
Significant at *: $p < 0.05$, **: $p < 0.01$, ***: $p < 0.001$

Measurement Result

The SEM was conducted to evaluate the proposed models and test the research hypotheses. A two-stage approach designed by (Byrne, 2016 & Hair Jr et al., 2018) was used in this study. First, the measurement model might be based on a confirmatory factor analysis (CFA) to test the reliability and validity of the research constructs. The structural model was used to test the strength and direction of the proposed relationship among constructs. The CFA results of the remaining 24 items showed the data had good suitability.

Table 3: *Measurement Results*

Constructs	MLE estimates factor loading/ measurement error		Squared multiple correlation (SMC)	Composite reliability (CR)	Average of variance extracted (AVE)	Cronbach's α
Social Media Interactions				0.857	0.602	0.851
SI1	0.863	0.255	0.745			
SI2	0.778	0.395	0.605			
SI3	0.719	0.483	0.517			
SI4	0.735	0.460	0.540			
Social Media Content				0.891	0.620	0.889
SMC1	0.780	0.392	0.608			
SMC2	0.786	0.382	0.618			
SMC3	0.820	0.328	0.672			
SMC4	0.795	0.368	0.632			
SMC5	0.753	0.433	0.567			
Communication Style				0.888	0.613	0.886
CS1	0.767	0.412	0.588			
CS2	0.828	0.314	0.686			
CS3	0.772	0.404	0.596			
CS4	0.807	0.349	0.651			
CS5	0.736	0.458	0.542			
Youth Mental Health				0.896	0.591	0.891
MH1	0.814	0.337	0.663			
MH2	0.789	0.377	0.623			
MH3	0.742	0.449	0.551			
MH4	0.769	0.409	0.591			
MH5	0.716	0.487	0.513			
MH6	0.777	0.396	0.604			

Fit statistics (N = 606)
χ^2/df = 2.801, Goodness-of-Fit Index (GFI) = 0.928, Nonnormed fit index (NFI) = 0.935, Comparative Fit Index (CFI) = 0.957, Incremental fit index (IFI) = 0.957, Tucker Lewis Index (950) and Root Mean Square Error of Approximation (RMSEA) = 0.055

Structural Model

The model that was fit for the data was sufficient. The summary in table 4 shows that there was a positive and significant relationship between social media content and social media interactions (0.792; $p < 0.001$), social media interactions and communication style (0.567; $p < 0.001$), which supported H1 and H2. Similarly, H3 and H4 were supported, which means a positive relationship between social media content and youth mental health (0.096; $p < 0.001$)

and communication style and youth mental health (0.256; p < 0.001). Therefore, H1, H2, H3, and H4 were supported in this study. Figure 2 shows the structural model adopted in this study.

Table 4: *Proposed Model Results*

Hypotheses	Symbol	Path		Coefficients	Test results
H1	γ_{31}	Social Media Interactions	→ Social Media Content	0.792***	Supported
H2	γ_{11}	Social Media Interactions	→ Communication Style	0.567***	Supported
H3	γ_{21}	Social Media Content → Youth Mental Health		0.096*	Supported
H4	β_{31}	Communication Style → Youth Mental Health		0.256***	Supported

Note. Significant at *: $p < 0.05$, ***: $p < 0.01$, ***: $p < 0.001$

Mediating Effect

This study adopted the procedure recommended by (Hayes, 2018) to validate mediator variables (e.g., social media content and communication style). Table 5 shows the mediation analysis showing that 95% of the CI of all indirect effects tested and partial roles did not include zero. It was concluded that social media interactions had a significant indirect effect on youth mental health without mediator variables (for example, social media content and communication style).

Table 5: *Mediation Effects*

IV	M	DV	IV->DV (c)	IV->M (a)	IV+M->DV		Bootstrapping 95% CI	
					IV (c')	M(b)	Percentile method	Bias-corrected
SI	SMC	MH	0.035	0.637***	0.167**	0.208*	[0.037, 0.056]	[0.171, 0.270]
Standard Error			0.065	0.032	0.051	0.060		
SI	CS	MH	0.008	0.530***	0.167***	0.300***	[0.077, 0.126]	[0.176, 0.274]
Standard Error			0.057	0.040	0.051	0.051		

Note. SI: Social Media Interactions, SMC: Social Media Content, CS: Communication Style, MH: Youth Mental Health
Significant at *: $p < 0.05$, **: $p < 0.01$, ***: $p < 0.001$

Discussion

Key Findings

This study confirms that social media content has an important role in influencing youth mental health, it is necessary to be careful in choosing or sharing content on social media. They also believe that social media, particularly available content, plays an important role in facilitating interaction with teachers, other students, learning communities, and society, particularly for students. In addition, it will increase knowledge with the ease of information

available on social media. This is an innovative finding that, to our knowledge, has not been uncovered by previous research. In particular, the results show that social media content can meet their needs such as communication, and entertainment (sharing reels, routines, watching live videos, reading news related to culture, food, movies, fashion, etc.). Content plays an important role in social media interactions. This implies that social media and prepared facilities such as available content have a strong correlation with students' enthusiasm and health conditions. The study results confirm previous research which concluded that social media content has a positive and significant effect on social media interactions (Dedeoglu, 2019; Kemp, 2020; Lin & Lu, 2011).

This study also confirms that communication style on social media also plays an important role in influencing social media interactions. This means that communication styles provide students with new experiences, such as verbal and written communication, as well as non-verbal communication such as commenting on images, videos, stickers, emotions, or tapping the like/unlike button. In addition, it also motivates students to always use social media as a means of interaction. However, well-used social media has a positive and significant effect in bridging and enhancing the relationships between students and teachers; students with other students; students and families; Students and social communities. This proves that social media plays an important role in influencing student interactions on social media. Communication style and social media interactions also increase the frequency of social media adoption. As a result, it fosters a sense of belonging and familiarity between students and teachers, families, and others. This also proves that the student's primary motive is interaction on social media and it also reinforces that the communication style used or accepted will be very important in bridging students' thoughts and views when interacting or using social media. These results support previous research by (Vraga et al., 2016; Zarzycka et al., 2021) who concluded that communication style has an important role in influencing social media interactions.

The uniqueness of the concern is how the condition of youth mental health. Content and communication styles on social media are interesting tools for students to find out the student's mental health condition through interactions carried out on social media. The content and communication style used also play an important role in influencing youth mental health. Therefore, this study confirms previous studies (Goodyear et al., 2018; Granic et al., 2020; Kemp, 2020; Shen, 2020). Interestingly, social media content and communication style have a partial role in mediating the relationship between social media interactions and youth mental health. This implies that the students' pedagogical and comfort needs should be more focused on problem-based learning, service-learning, and project-based learning. It has a strong correlation between the convenience of interaction on social media and youth mental health experienced by students. These results are also in contrast to (Granic et al., 2020; Sims et al., 2017), who found that social media plays an important role in students' mental health.

Conclusions

The use of social media fosters critical thinking about communication interpretation and purpose. The provision of content/features and communication styles presented can shift students' focus to the important goals of using social media. A framework that integrates the driving factors of the interaction process on social media in the framework of developing positive communication, technology, social media content, communication style, and youth mental health. These guidelines help to maintain the bonding of students and teachers,

families, and other communities, which in turn affects student interaction, student communication, and positive mental health. The social motivation of students' contexts can be utilized as a use of the effectiveness of communication on social media. The results indicate that the main motivator of students in this context is the effectiveness and convenience of using social media, particularly in the use of content and communication with the determination of individuals and student communities. One way to predict the widespread of social media interaction options is to examine the motivation for using it individually, socially, and within the context of the student's environment. According to the findings, mental health is more particular, and choosing to participate in social media interactions is what drives students in these situations.

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An Analysis of English Vocabulary in Hong Kong Textbooks for Bilingual Children

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Abstract
Vocabulary acquisition is central to building literacy, yet there is little research on the vocabulary component of textbooks for school children. Acquiring the vocabulary of a language is commonly interpreted as simply "knowing the meaning of the words and being able to use the words", acknowledging the receptive and productive aspects of vocabulary. However, Nation proposes that knowing a word involves nine aspects (categorized into "form", "meaning", and "use") from the perspective of second language learning. This study shows that among the most popular primary English textbooks in Hong Kong (3 major publishers; 9 textbooks in total), "form and meaning" receives the most attention, while "grammatical functions", "spoken form" and "written form" receive comparable attention. The other five aspects of vocabulary knowledge, including "word parts", "concept and referents", "associations", "collocations", and "constraints on use" receive little or no attention. This study explores the phenomenon by drawing upon vocabulary literature and the primary curriculum in Hong Kong. It suggests that researchers and industry collaborators need to consider a more holistic view of vocabulary knowledge, thus enhancing children's L2 lexical diversity via their exposure to English textbooks with L1 input.

Keywords: Aspects of Vocabulary Knowledge, English Textbooks for Bilingual Children, Lexical Diversity

Introduction

What does it mean to learn a word? It is commonly thought that learning a word is equivalent to learning its meaning. According to Singleton (1999), vocabulary teaching is "addressing only the tip of the lexical iceberg". Literature has long discussed incidental and intentional vocabulary learning through exposure to input, yet there is little research on the vocabulary component of textbooks (Nordlund, 2015). We have especially limited understanding of how bilingual children (L1: Cantonese; L2: English) in Hong Kong acquire vocabulary from English textbooks.

In 2022/23, there were 593 primary schools and 333,551 students[1] in Hong Kong. Most primary students use English textbooks at school every day. As primary and compulsory learning material for such a significant number of bilingual primary school children (aged 6-11), this study examines the aspects of vocabulary knowledge (Nation, 2001) conveyed to students via the activities in nine English textbooks from three major publishers across three levels (Primary 1, 3, 5) which are widely used in Hong Kong primary schools.

Research Background

The majority of students in Hong Kong use textbooks at school as the primary learning materials. Textbooks undoubtedly play a dominant role in classroom practice and most teaching programs (McDonough & Shaw, 1993). Littlejohn (1998) even considered textbooks as "the most powerful device" to transmit knowledge from teachers to students.

As a source of language input, the vocabulary in textbooks builds a student's lexical diversity (LD), which is regarded an objective indicator of language development (Malvern, et. al., 2004) and language ability (Treffers-Daller, et. al., 2018). According to Jarvis and Hashimoto (2021), the essence of LD is the variety of words that appear in spoken and written discourse.

Other than variety (breadth), this article studies primarily various aspects of vocabulary knowledge (depth). Although acquiring the vocabulary is commonly interpreted as simply "knowing the meaning of the words and being able to use the words", Nation (2001) suggested that knowing a word involves three main aspects including form, meaning, and use, and each of these aspects contains three corresponding sub-aspects as shown in Figure 1 below:
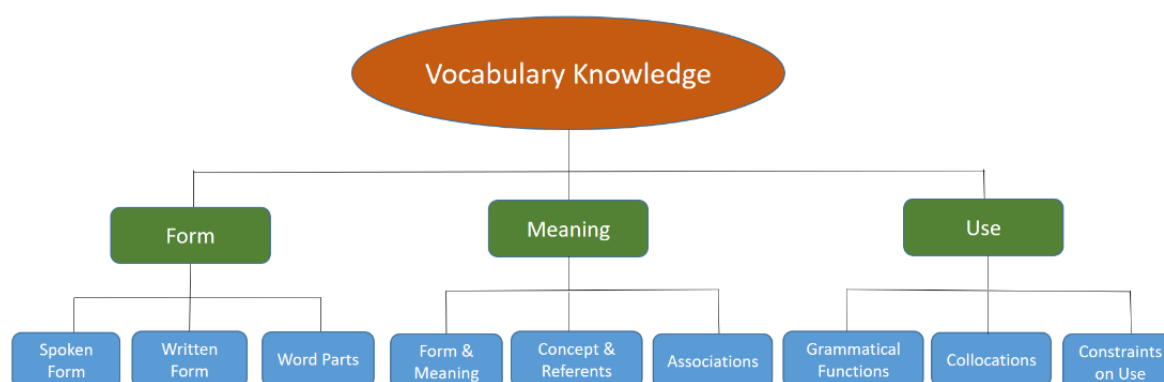

Figure 1: Aspects of vocabulary knowledge (Nation, 2001)

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[1] https://www.edb.gov.hk/en/about-edb/publications-stat/figures/index.html

Each of the vocabulary aspects encompasses a productive and expressive part as shown in Table 1 below:

Form	Spoken form	R	What does the word sound like?
		P	How is the word pronounced?
	Written form	R	What does the word look like?
		P	How is the word written and spelled?
	Word parts	R	What parts are recognizable in this word?
		P	What word parts are needed to express the meaning?
Meaning	Form and meaning	R	What meaning does this word form signal?
		P	What word form can be used to express this meaning?
	Concept and referents	R	What is included in this concept?
		P	What items can the concept refer to?
	Associations	R	What other words does this make us think of?
		P	What other words could we use instead of this one?
Use	Grammatical functions	R	In what patterns does the word occur?
		P	In what patterns must we use this word?
	Collocations	R	What words or types of words occur with this one?
		P	What words or types of words must we use with this one?
	Constraints on use (register, frequency…)	R	Where, when, and how often would we expect to meet this word?
		P	Where, when, and how often can we use this word?

Note: R = receptive vocabulary; P = productive vocabulary

Table 1: Productive and expressive parts of vocabulary knowledge (Nation, 2001)

Brown (2010) carried out a study on vocabulary activities in English textbooks for secondary students in Japan. The study shows that a single aspect of vocabulary knowledge – form and meaning – receives the most attention in the textbooks, while two other aspects – grammatical functions and spoken form – also receive attention. The other six aspects – written form, word parts, concept and referents, associations, collocations, constraints on use – receive little or no attention.

Following Brown's study, one question calling for investigation is whether Hong Kong children's vocabulary depth is enhanced through acquiring other aspects of vocabulary knowledge from the textbook activities. This is not to say that students have to acquire every aspect of vocabulary items, and all aspects should receive equal attention. In many circumstances, knowing the meaning of the words would suffice for communicative purposes. This article argues that vocabulary activities in textbooks should cover all aspects to give a balanced exposure to students who may acquire various aspects in both receptive and expressive parts through incidental or intentional learning (Yeung et. al., 2020).

In a bilingual context such as Hong Kong, we need to consider the role of children's existing vocabulary knowledge in their first language, in this case Chinese. Hui et. al. (2016) compared Chinese-English bilingual students' L2 vocabulary acquisition with entirely no L1 support, principled L1 support (gloss provided), and full L1 support (bilingual texts provided). Students with a principled amount of L1 support (specifically, glosses provided in Chinese) performed best in L2 vocabulary learning, while those in the L2-only and bilingual texts conditions performed similarly. Some educational implications of these findings will be pursued in the discussion section.

Research Questions

This study attempts to answer three research questions:
1. What aspects of vocabulary knowledge are presented in Hong Kong primary English textbooks?
2. Why are only some aspects primarily covered whereas other aspects are not emphasized?
3. How can Chinese-English bilingual children acquire more aspects of vocabulary knowledge?

Methodology

We have examined nine primary English textbooks published by three major publishers in Hong Kong, across 3 levels for primary 1, 3 and 5.

Title	Author	Publisher	Year of publication
Head Start 1A	Taylor, C. A.	Educational Publishing House: Hong Kong.	2017
Head Start 3A	Beare, J. N. C.		
Head Start 5A	Manin, G. J.		
Primary Longman Elect 1A	Lanaway, J. & Monk, C.	Pearson: Hong Kong.	2023
Primary Longman Elect 3A			
Primary Longman Elect 5A			
Oxford Ready 1A	Pozzoni, A. & Leung, L. K.	Oxford University Press: Hong Kong.	2017
Oxford Ready 3A			
Oxford Ready 5A			

Table 2: Nine primary English textbooks examined in this study

This study defines a vocabulary activity as any activity that focuses on the form, meaning or use of the selected vocabulary specified in each chapter of the textbook. The vocabulary activities include question types such as multiple-choice questions, filling in blanks, matching questions and answers, etc. All vocabulary activities from these textbooks were counted and identified with the corresponding aspects of vocabulary knowledge to calculate the mean percentage.

In identifying the aspects of vocabulary knowledge involved in an activity, this study focuses on the aims of each activity. For example, many activities assess students' grammar knowledge, but only those that aim to pay attention to grammatical functions are counted as such.

This study is part of a larger project aiming to create the first Hong Kong Primary English Textbook Corpus for further linguistic analysis and research. We extracted all the vocabulary items from the nine textbooks across three levels by three publishers.

Table 3 shows the detailed figures from the nine textbooks in this study. It is evident that children are exposed to increasingly more target vocabulary as they progress from primary 1 to 3 and 5. The number of words in the textbooks also increases, showing greater lexical diversity as the level goes up.

	Primary Longman Elect			Head Start			Oxford Ready			
	1A	3A	5A	1A	3A	5A	1A	3A	5A	Total
Number of vocabulary activities	69	76	74	69	67	64	77	76	80	652
Number of target vocabulary items	60	65	83	62	78	62	51	52	60	573
Number of words	3762	6273	9873	4836	7532	10266	3853	6370	10214	62943

Table 3: Increasing trend of vocabulary activities, target vocabulary, and lexical diversity in primary 1, 3, and 5 English textbooks

Table 4 shows the percentage of various parts of speech in each book of a textbook series. In primary 1, children are mostly exposed to nouns and verbs, and when they get to primary 3, they learn adjectives. When they reach primary 5, the parts of speech in target vocabulary are more wide-ranging. In addition to nouns, verbs and adjectives, children get exposed to adverbs and prepositions.

	Noun	Verb	Adjective	Adverb	Preposition
Primary Longman Elect 1A	73%	10%	0%	0%	0%
Primary Longman Elect 3A	72%	28%	15%	0%	0%
Primary Longman Elect 5A	41%	33%	17%	7%	2%

Table 4: Enlarged parts of speech in primary 1, 3, and 5 English textbooks

Discussion

Research question 1 asks what aspects of vocabulary knowledge are presented in Hong Kong primary English textbooks. Table 5 gives a detailed picture of the mean percentage of all vocabulary aspects in Hong Kong primary English textbooks:

	Form and Meaning	Grammatical Functions	Spoken Form	Written Form	Collocations	Concept and Referents	Associations	Word Parts	Constraints on Use
Primary Longman Elect 1A	80%	57%	45%	38%	0%	3%	0%	0%	0%
Primary Longman Elect 3A	75%	50%	46%	29%	8%	3%	1%	0%	0%
Primary Longman Elect 5A	70%	42%	41%	32%	9%	0%	0%	4%	0%
Head Start 1A	70%	49%	41%	35%	4%	3%	1%	0%	0%
Head Start 3A	76%	52%	34%	46%	3%	1%	3%	0%	0%
Head Start 5A	67%	53%	28%	50%	5%	2%	3%	0%	0%
Oxford Ready 1A	65%	44%	42%	32%	0%	8%	0%	0%	0%
Oxford Ready 1A	76%	51%	45%	43%	3%	4%	0%	0%	0%
Oxford Ready 1A	78%	49%	35%	49%	4%	0%	1%	1%	0%
Mean (of percentage)	73%	49.70%	39.50%	39.40%	4%	2.60%	1.10%	0.60%	0%

Table 5: Mean percentage of all vocabulary aspects in Hong Kong primary English textbooks

Figure 2 gives a clear picture of the distribution of the vocabulary aspects covered in activities in Hong Kong primary English textbooks. Similar to Brown's study, "form and meaning" receives the most attention (73%), then grammatical functions (49.7%), then spoken form (39.5%), and finally written form (39.4%).
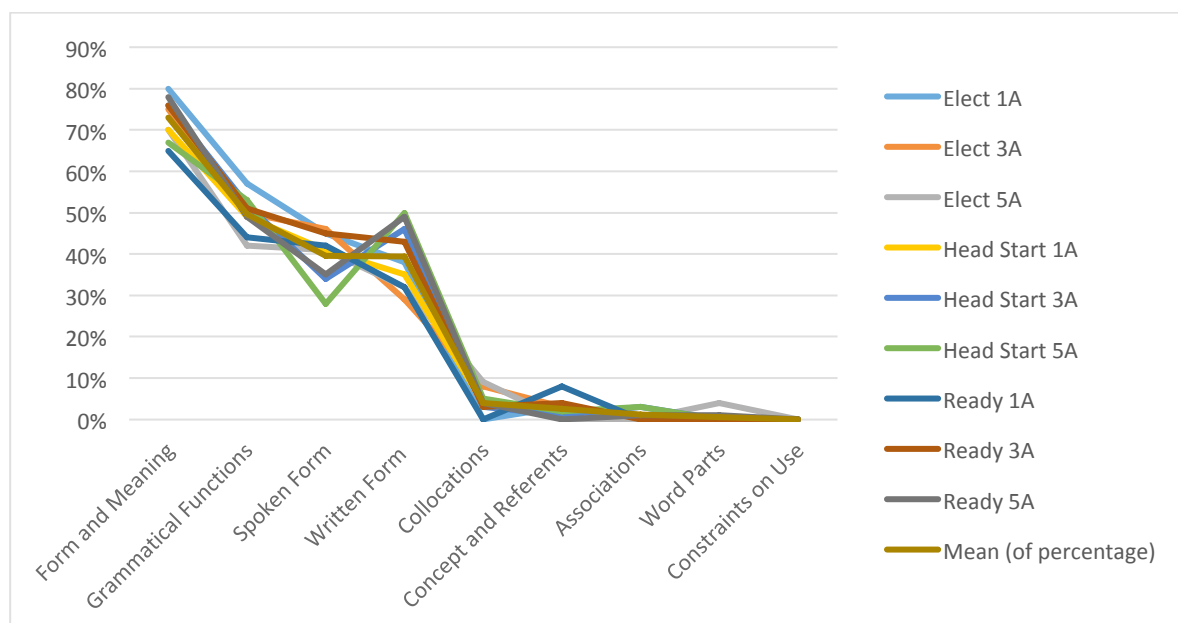
Figure 2: Vocabulary aspects in Hong Kong primary English textbooks

Below we illustrate the four most prominent vocabulary aspects with a corresponding activity extracted from the textbooks based on Brown's activity-aspect definitions in Table 6:

Aspects of vocabulary knowledge	Definitions
Form and meaning	An activity that involves matching forms and meanings (expressed as, for example, definitions or pictures). An activity that involves recalling forms from meanings or recalling meanings from forms. An activity that explains the meanings of items.
Grammatical functions	An activity that requires students to manipulate a word in some way with respect to a sentence, for example, by adding it to the sentence in the correct position. An activity that explains the patterns an item appears in or that asks learners to find these patterns. Activities that simply ask students to use the items in speech or writing are not included.
Spoken form	An activity that requires students to notice the pronunciation of an item or to produce its features. An activity that involves matching the spoken form the written form. Activities that include the pronunciation of items (for example, in a listening passage), but draw no special attention to the form are not included.
Written form	An activity that focuses students' attention on the spelling of items. Activities that involve reading or writing the items as part of the process of doing something else are not included.

Table 6: Vocabulary activity-aspect definitions (Based on Brown, 2010)

i.   Form and Meaning (73%)

This category refers to any activity that involves matching forms and meanings, expressed using, for example, definitions or pictures. In the following question, students have to find clues from the reading passage on p.63, and choose the correct picture to match 'kilt'' with the correct picture. This activity requires students' vocabulary knowledge of form and meaning.

Figure 3: "Form and meaning" as shown in a vocabulary activity
(*Longman Elect 1A,* p.65)

Here we may note that the choice of vocabulary is not culturally appropriate to the Hong Kong context, since a kilt is not part of children's experience (nor it is a useful target item).

ii.   Grammatical Functions (49.7%)

Grammatical functions refer to any activity that requires students to manipulate a word in some way with respect to a sentence, for example, by adding it to the sentence in the correct position. As shown in Figure 4, students are learning to use "do" and "does" in the correct position in a question, and to use gerunds in sentences after the verb "like", for example "I like doing ballet.". Then they have to talk about the activities Andy's friends like doing using the words given.

Figure 4: "Grammatical functions" as shown in a vocabulary activity
(*Oxford Ready 3A,* p.7)

iii.   Spoken Form (39.5%)

Spoken form refers to any activity that requires students to notice the pronunciation of an item. This activity requires students to correctly pronounce the /v/ sound as in "Vincent", "Visual", "Victor", and "voice".
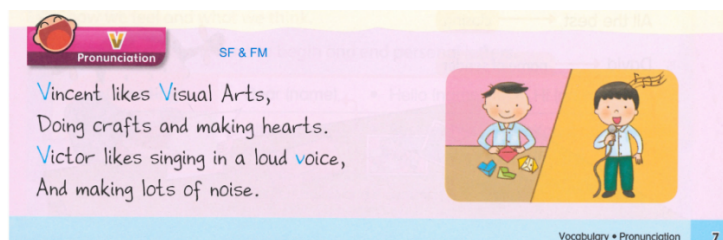
Figure 5: "Spoken form" as shown in a vocabulary activity (*Head Start 3A, p.7*)

iv.   Written Form (39.4%)

Written form refers to any activity that focuses students' attention on the spelling of items. In this activity, students have to fill in the characteristics of the giraffes featured in the fact sheet, according to the reading passage.
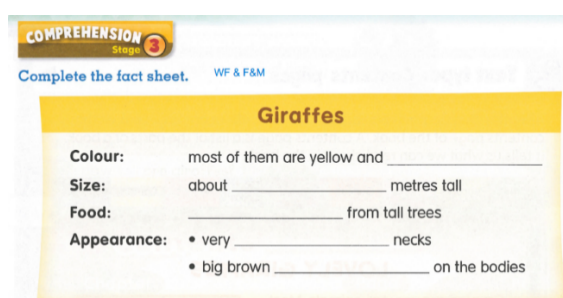

Figure 6: "Written form" as shown in a vocabulary activity (*Head Start 3A, p. 60*)

Research question 2 asks why only some aspects are primarily covered whereas other aspects are not emphasized. To address this question, we draw upon clues from the Hong Kong Primary English Curriculum devised by the Hong Kong Education Bureau.
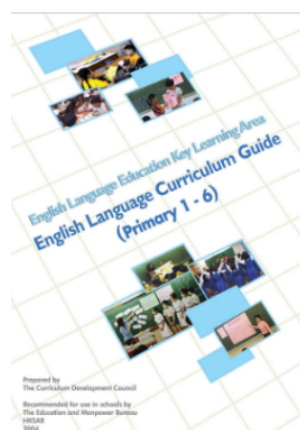

Figure 7: English Language Curriculum Guide (Primary 1-6) in Hong Kong

Some key words in the curriculum explain why the four aspects of vocabulary knowledge are primarily covered.

- *... Vocabulary is best introduced **in context**. (p.18)*
- *... Tasks provide **authentic contexts** for vocabulary use... (p.18)*
- *… express a wide range of ideas and experiences for **communicative purposes**… (p.19)*

- *... **Communicative functions** set out what learners should be able to do in English through **listening, speaking, reading and/or writing**... (p.19)*
- *... Learners need to use a range of **grammar items and structures** to serve various **communicative functions**... (p.21)*

The Bureau advises that vocabulary is best introduced in an "authentic" context, so that students are taught to express a wide range of ideas and experiences for communicative purposes through listening, speaking, reading and/or writing. Moreover, they need to use a range of grammar items and structures to serve various communicative functions.

In short, the curriculum is about "communicative functions", "language skills" (reading, writing, listening, speaking), and "grammar", as shown in Figure 8.
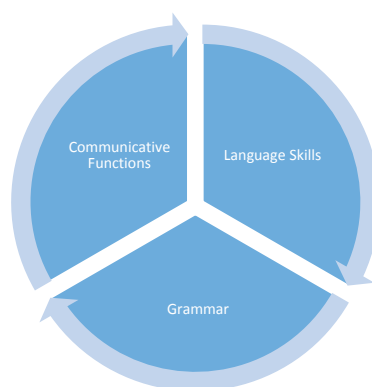

Figure 8: Key learning outcomes in the English Language Curriculum Guide (Primary 1-6) in Hong Kong

In order to have teaching materials approved by the Bureau, developers aim to follow the curriculum framework with these key learning outcomes in the design of textbooks.

Research question 3 asks how Chinese-English bilingual children acquire more aspects of vocabulary knowledge. Here it is vital to consider the children's language environment. As an international city with rich linguistic culture and political history, Hong Kong has three principal languages, including Cantonese, English and Putonghua. While a large number of Hong Kong people are trilingual speakers of Cantonese, Putonghua and English to different degrees, Cantonese remains the most widely spoken language in Hong Kong, with more than 85%[2] of the Hong Kong population speaking Cantonese as their L1. Since 1997, the policy of the Hong Kong Special Administrative Region has been to promote "biliteracy and trilingualism" in education, which aims to enable students to become biliterate in written Chinese and English and trilingual in spoken Cantonese, English and Putonghua.

In our view the use of L1 in textbooks needs to be promoted. However, some parents and teachers worry that this will impede the acquisition of the second language. Research has shown that this is a misconception, and the first language can be helpful in learning English. 'Translanguaging' is a growing trend which encourages learners to use their whole repertoire of languages, whatever they are learning. In this perspective, using L1 to support L2 learning

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[2] https://www.censtatd.gov.hk/en/

in the classroom is not only legitimate, but to be encouraged on the grounds that it leads to more effective learning (Li, 2018).

The textbooks reviewed in this study take a "monolingual" approach to the teaching of English, eschewing any use of Chinese. The one exception to this rule is that the *Oxford Ready* series includes a self-learning booklet in bilingual format designed to be used at home. The following page extracted from the self-learning booklet serves as an illustration of the use of L1 in teaching L2. The selected vocabulary, "a cinema" and its example sentence comes with their Chinese translation. "A cinema" goes with "電影院", and "I watch a film in a cinema." goes with "我在電影院看電影."
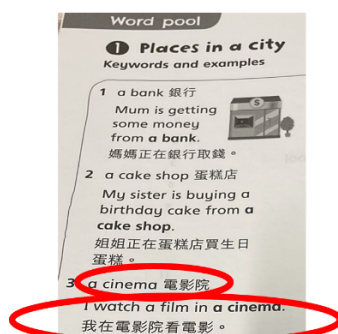

Figure 9: L1 (Chinese) gloss provided in L2 (English) primary textbook's
self-learning booklet in Hong Kong

Such materials are consistent with the research findings cited earlier, whereby glosses in students' first language are conducive to more effective L2 vocabulary learning (Hui et. al., 2016).

Future Research

This study is part of a larger project aiming to build the first Hong Kong primary English textbook corpus. To create the corpus, we will include data from 84 textbooks in 7 major series across primary 1 to 6. Other than English, this method can be extended to diverse target languages to create multilingual textbook corpora.

This corpus allows us to address a number of impactful research questions:
- What are the target vocabulary items and the total number of target vocabulary items in each level? Are they age-appropriate and culturally appropriate?
- What is the frequency of individual vocabulary items across textbooks for each level?
- What are the parts of speech of each word (e.g. noun, verb, adjective, adverb, preposition, determiner, etc.)?
- What are the lexical diversity indices (e.g. VOCD, MATTR, etc.)?

From the corpus we can see the similarities and differences between these vocabulary items, paving the way for further research in whether the differences are due to children's age, the themes required in the curriculum, or others. The corpus also shows the lexical diversity indices which are vital to reveal whether the textbooks are too difficult or too easy when we compare the lexical diversity between the textbooks and the children's everyday discourse.

Conclusion

The design of Hong Kong primary English textbooks is governed by the "communicative" approach in the curriculum recommended by the Education Bureau. Under such approach, the vocabulary activities primarily focus on "Form and Meaning" knowledge aspect, followed by "Grammatical Functions", "Spoken Form", and "Written Form".

For a balanced development, textbook publishers and industry collaborators may consider enlarging the spectrum of vocabulary knowledge in textbook activities. At present, L1 glossing is available in the self-learning booklet that goes with the textbook in one of the series examined. This approach is informed by childhood bilingualism research showing that "translanguaging" is a growing trend which encourages learners to use their whole repertoire of languages.

Moreover, the creation of our Hong Kong primary English textbook corpus enables us to conduct a systematic analysis of vocabulary in textbooks and identify the gaps in vocabulary knowledge. The findings can inform teaching and learning of vocabulary in bilingual children. The corpus answers many important research questions for the benefit of childhood L2 literacy development. In future, we can also compare materials with or without L1 support and see how effective they are as a source of input for bilingual children.

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Research on the Training Mode of Indoor Design Majors Based on the Integration of Industry and Education

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Abstract

In China, the integration of industry and education refers to the close integration, mutual support, and mutual promotion of industrial practice and school education emphasized by schools in accordance with the needs of their students. It is a significant initiative to adapt applied majors to social and economic development, realize high-quality teaching, and enhance the comprehensive strength of students. Given the needs of the interior design profession, the following four aspects were analyzed and elaborated: the optimization of the progressive school-enterprise cooperation design talent cultivation mode and the "subject system" professional course structure; the dual-mentor system of school-enterprise cooperation and dual-teacher training in parallel with the construction of teaching teams; the construction of an interactive digital professional teaching platform and shared resource library; and the construction of a whole-process professional ability and vocational quality assessment and evaluation system with participation by mentors from schools and enterprises. This study attempted to develop an effective study path for indoor design majors to deeply implement the integration of industry and education and efficiently change the talent cultivation mode, and to help indoor design majors to improve the quality of talent cultivation in the practice of integrating industry and education.

Keywords: Industry-Education Integration, Interior Design, Training Mode

Introduction

With the rapid development of contemporary society, China's educational philosophy, training mode, development goals and teaching methods for college and university talents are more and more demanding, so it becomes imperative for colleges and universities to promote the reform of education and teaching mode. As an application-oriented specialty with strong comprehensive and practical ability, "Interior Design" focuses on cultivating high-quality and high-quality innovative talents with rich professional knowledge, solid practical ability, and the ability to independently cope with multidisciplinary cross-disciplinary problems. The Outline of the National Medium and Long-term Educational Reform and Development Plan (2010-2020) emphasizes that the education of students should "insist on the emphasis on ability, optimize the knowledge structure, enrich the social practice, and strengthen the cultivation of ability." Therefore, for the teaching reform of "interior design", it is necessary to break the existing teaching mode stereotypes, single teaching method and a series of problems, continuous exploration of the relationship between theory and practice, to ensure the sustainable development of interior design education and teaching, attach great importance to the practical aspects of the teaching process, to improve students' practical and innovative ability, to cultivate students with creative thinking, and to improve students' ability to practice and innovation. In the process of teaching, the practice link is highly emphasized to improve students' practical and innovative ability, and to cultivate applied talents with creative thinking and able to adapt to the work of the real society.

"Talent cultivation mode" refers to the sum of the process of implementing talent education under the guidance of certain modern educational theories and ideas, and in accordance with specific cultivation objectives and talent specifications, with relatively stable teaching content and curriculum system, management system and assessment methods. The traditional university professional training mode generally refers to the universities under the guidance of the relevant education departments, according to their own characteristics, in order to achieve certain training objectives and specifications, the teaching concept, teaching content, teaching methods, teaching methods and teaching resources and other aspects of the organic combination of the development, in general, are based on the main body of school education to complete.

With the rapid development of contemporary society, China's education concept for college and university talents, training mode, development goals and teaching methods require more and more high, so colleges and universities to promote education and teaching mode reform becomes imperative. As an application-oriented specialty with strong comprehensive and practical ability, "Interior Design" focuses on cultivating high-quality and high-quality innovative talents with rich professional knowledge, solid practical ability, and the ability to independently cope with multidisciplinary cross-disciplinary problems. The Outline of the National Medium and Long-term Educational Reform and Development Plan (2010-2020) emphasizes that the education of students should "insist on the emphasis on competence, optimize the knowledge structure, enrich the social practice, and strengthen the cultivation of competence". Therefore, for the teaching reform of "interior design," it is necessary to break the existing teaching mode stereotypes, single teaching method and a series of problems, continuous exploration of the relationship between theory and practice, to ensure the sustainable development of interior design education and teaching, attach great importance to the practical aspects of the teaching process, to improve the practice and innovation ability of students, to cultivate students with creative thinking, to improve their ability to practice, to enhance their ability to learn, to develop their ability to think creatively, to develop their

ability to learn. In the process of teaching, the practice link is highly emphasized to improve students' practical and innovative ability, and to cultivate applied talents with creative thinking and able to adapt to the work of the real society.

"Talent cultivation mode" refers to the sum of the process of implementing talent education under the guidance of certain modern educational theories and ideas, and in accordance with specific cultivation objectives and talent specifications, with relatively stable teaching content and curriculum system, management system and assessment methods. The traditional university professional talent training mode generally refers to the universities under the guidance of the relevant education departments, based on their own characteristics, in order to achieve certain training objectives and specifications, the teaching concept, teaching content, teaching methods, teaching methods and teaching resources and other aspects of the organic combination of the development of the overall are based on the main body of school education to complete.

Modern society, the scientific and technological revolution is more rapid, the development of globalization is more obvious, and the flow of information is more rapid. Interior design as a typical practice-oriented professional, the traditional personnel training model can not adapt to the development of society, the requirements for personnel training no longer only stay in the design of theoretical knowledge, mastery of design skills and techniques of the basic stage, should also pay attention to the innovation and practice ability, teamwork ability, lifelong learning ability and vocational literacy training. How to build in line with the modern development requirements of the interior design personnel training model, this paper to the perspective of the development of industry-teaching integration, from the following four aspects of specific description.

Progressive School-Enterprise Cooperation Design Teaching Mode and Optimization of the Professional Curriculum Structure of "Subject System"

The rapid development of the society promotes the increasing demand for professional talents in all walks of life, and the requirements are getting higher and higher. Therefore, it is of great significance to accelerate the training of professional talents combining theory and practice for economic and social development. Since the domestic colleges and universities in the interior design professional teaching process is more focused on design theory and basic skills and techniques of training, coupled with the teacher structure and teaching resources and other reasons, practice teaching is in the initial exploration and development stage. The interior design industry has a large number of professional designers with outstanding practical ability and a rich variety of practical project resources, which is exactly what is lacking in the design teaching in colleges and universities. The teaching mode of school-enterprise cooperation refers to the use of schools and industry enterprises to collaborate on teaching activities, the purpose is to support the teaching process with the help of enterprises, resource sharing, complementary advantages, and jointly complete the training of professional talents in line with the requirements of the development of the times. Therefore, the teaching mode of school-enterprise cooperation plays a very important role in promoting the development of interior design teaching, and at the same time, the training mode of school-enterprise cooperation can also accurately cultivate the industry and enterprises in urgent need of professionals, which is more conducive to the development and progress of society.

Progressive school-enterprise cooperation design teaching mode can be divided into three stages, the first stage, in the school's daily teaching, the enterprise to send specialists to participate in the teaching, the teacher can be part of the curriculum content, especially the design of the practical aspects of the content of the teaching moved to the project site of the cooperative enterprise teaching, combined with the practice of the case and the site situation, by the practice of the enterprise instructor and the teachers to complete the teaching content, so that students in the project can prove their theoretical knowledge and test their professional skills in the project environment. In the second stage, the school and the enterprise build a training base together, simulating the working environment of interior design, so that the students can experience the professional design environment and working process in their study. The school makes use of the technical guidance of enterprises to make up for the deficiencies in practical teaching and improve the construction of teaching system. Enterprises utilize the school's student source, site and practical training equipment to realize order-type training and establish talent reserves. At the same time, students can experience the future working environment in school, learn more professional practical experience, and gradually strengthen their professional awareness and improve their professionalism. The third phase of the student all-day nature of the internship status into the enterprise for practical learning, the purpose is to learn in the students to learn professional practice knowledge at the same time, but also be able to learn to use. After the completion of the internship period, students can sign a formal labor contract with the enterprise in accordance with the principle of two-way choice, and become a full-fledged employee. Enterprises can also obtain more human resources through this model, reducing the cost of enterprise talent training.

Traditional design teaching courses are independent individuals, most teachers only stand on the narrow perspective of a single course to complete the teaching task, not too much attention to the linkage between the courses, not enough articulation between the courses, the lack of knowledge before and after the guidance. The teaching of interior design courses covers both theoretical teaching and practical application, but due to the teaching conditions, teaching environment, syllabus requirements and teacher background and other constraints, most of the practical teaching in the teaching process lacks effective real cases, and generally choose the "virtual subject" to complete, and the students are not familiar with the objective conditions such as spatial scale, architectural form, design needs, environmental composition and so on. Students have no intuitive feeling about the objective conditions such as spatial scale, architectural form, design demand, environmental composition, etc., and they rely on their feelings and imagination in the process of assignments, which lacks objective basis, thus leading to the lack of professionalism and design depth in the final assignments completed by students. Moreover, the assessment of the assignments is usually done by the teachers, and there is a lack of professional evaluation by the "third party" in this process.

The use of "project system" in interior design teaching is, first of all, an enhancement of the ability of teachers. Teachers should carry out the relevant practical courses of the proposition of the examination, research teaching process how to will be through the curriculum, how to guide the students to independent inquiry learning, enhance the interest in the professional learning process and concentration. Secondly, the implementation of the "project system" of real problems, how to choose the corresponding actual projects, set reasonable and effective design requirements and control of the practical learning process is also a major test of the practical skills of teachers. This prompts teachers to go out of the classroom and actively participate in the practical design projects, so that they can better combine theory and practice in teaching and promote the improvement of teachers' professional skills. In addition, the

teaching of "project-based" courses can effectively guide students to strengthen independent learning and stimulate their ability to explore new problems, think about new problems and take the initiative to solve problems. It is also conducive to students' systematic mastery of the design process, cultivation of practical application skills, and enhancement of the sense of teamwork. The development of the "project system" can effectively improve the communication and cooperation between students, students and teachers, teachers and teachers, promote the improvement of teachers' and students' ability to communicate with the outside world, build a bridge between the school and society, and lay a solid foundation for students' internships, graduation and even going to the workplace.

Teaching Team Building Through School-Enterprise Cooperation of "Dual-Mentorship" and "Dual-Teacher" Teacher Training in Parallel

Teachers - nowadays refers to the talents who can be teachers, from "Laozi", is the most important part of education. It is the most important part of education. It is an inevitable trend for the development of education and teaching in China to continuously strengthen the training of teachers, optimize the structure of the teaching team, and improve the competence level of teachers. With the development of society and the passage of time, the relative cross-sectionality, comprehensiveness and practicability of the interior design profession are increasing, and the trend of linkage and combination with multidisciplinary and fringe disciplines is also becoming more and more obvious. In order to truly combine theory and practice, guide students to correctly understand and master professional knowledge and skills, so for the interior design teaching faculty restructuring, teachers' professional ability to improve and teaching team building has become an important initiative of professional teaching reform.

Since 2009, China has fully implemented the "dual tutor system", which is an effective way to cultivate high-level, high-quality, practical and strong applied talents in line with the requirements of social development, and is a positive exploration of innovative talent cultivation and reform of the path of colleges and universities. "Dual tutor system" is based on teacher education in higher education institutions, supplemented by practical guidance from enterprise tutors. School tutors teach basic theoretical knowledge in a collective way according to the syllabus and lesson plan, while enterprise tutors guide students according to their job duties, determine the guidance mode according to the characteristics of the students and the practical needs, formulate the guidance plan and implement it, and carry out the skills and techniques in a practical way. The enterprise tutors will instruct the students according to their job duties, determine the way of instruction according to the students' characteristics and practical needs, formulate the instruction plan and implement it, and teach the skills and techniques by practicing. At the same time, school tutors should study in depth in the enterprises, and enterprise tutors should study in depth in the schools, so that both sides can help each other and collaborate to educate people, fully mobilize the enthusiasm and creativity of the tutors inside and outside the school, and undertake the task of cultivating talents together.

The implementation of "dual tutor system" can effectively combine the relevant basic courses in school, project-oriented comprehensive practical course training, enterprise professional knowledge lectures, project site observation and internship, etc., so that the students, on the basis of sufficient accumulation of theoretical knowledge and systematic vocational cognition, can apply what they have learned to the practice of the enterprise and solve the various problems encountered in practice. On the basis of sufficient accumulation of

theoretical knowledge and systematic professional cognition, students can apply the knowledge they have learned to enterprise practice, solve various problems encountered in practice, and then deepen their understanding of theoretical knowledge through their own practical experience, thus enhancing their practical innovation ability and improving their personal professionalism. On the other hand, the experimental training resources can be integrated to realize the sharing of resources between schools and enterprises. Promote the construction of dual-teacher teaching team in colleges and universities, and then enhance the level of teaching and research and business ability of school teachers. At the same time let the enterprise deeply involved in the training process of the future employer, can give priority to select and raise a number of high-quality talents belonging to the enterprise's own reserve army, greatly reducing the cost of enterprise talent training, improve the quality of the talent.

For interior design professional construction, in promoting school-enterprise cooperation "dual tutor system" at the same time, should actively build the university's own "dual teacher" teacher teaching team. In recent years, the Ministry of Education at the national level issued a series of relevant documents on the promotion of vocational education, the introduction of these documents for the construction of the "dual-teacher" teacher teaching team to create a favorable external environment and provide institutional safeguards. "Dual-teacher" teachers should not only have excellent teaching ability and quality, but also have the professional skills required by industry standards and professional positions, including theoretical knowledge, industry skills and core qualities, including the embodiment of the comprehensive ability of the profession. Therefore, the interior design profession should be combined with its own characteristics of the targeted construction of "dual-teacher" teacher training system, to create a full professional lifeline of teaching, practice two-way cultivation channels, and strive to achieve the effective integration of the theoretical quality of teachers and practical teaching ability, to achieve the high quality of the development of teacher teaching team. Firstly, the cultivation of "dual-teacher" teachers should be systematically planned from the practical operation level, including obtaining vocational qualification certificates, on-the-job training, and participating in or guiding professional skills competitions. Secondly, we should innovate the training method of "dual-teacher" teachers, expand the mode and platform of teacher training, and provide teachers with special practical content and technology training. The third is to strengthen the cooperation between schools and enterprises, establish stable and high-quality internship bases inside and outside the school, and provide a good environment and conditions for the practice and teaching of teachers in the school. The construction of high-quality "dual-teacher" teacher team is an important guarantee to enhance the ability of interior design professional industry-teaching integration of educators, so in the cultivation of "dual-teacher" teachers at the same time, we should pay more attention to the construction and development of professional teaching team.

Construction of Digital Professional Teaching Interactive Platform and Shared Resource Library

Interior design is a multidisciplinary intermingling, comprehensive and independent disciplines, in professional teaching focus on theoretical knowledge and practical skills in parallel. Modern interior design teaching is no longer only satisfied with the teacher's classroom lectures, students passively accept the knowledge transfer mode, should build "student-centered" active learning classroom. Conventional teaching is confined to the classroom, which also greatly limits the long-term accompanying teaching by experts and enterprise mentors outside the school. Therefore, promoting the construction of proprietary

digital teaching interactive platform and shared resource library is an important support for the development of interior design professional teaching.

Create a Visualized Digital Space for the Whole Chain of Design Teaching With Collaborative Development of Teachers and Students

Mapping the physical classroom space of the offline traditional classroom to the online virtual digital space, by extending the classroom to the online virtual digital space, the whole chain of teaching before, during and after the process of uplinking and visualization is realized, no longer subject to the constraints of space, time, and teaching equipment, and the teachers and students teach, learn, communicate and share resources in the digital environment. The introduction of digital space to realize the teaching interaction between teachers and students, students can not only learn through the blackboard, projection and other conventional forms of teaching, but also at any time with their own cell phones, tablets or computers to enter the digital space for active learning and classroom interaction, such as uploading documents to express their own point of view, follow the teacher's point of view to view the information of the courseware, for the courseware of the specific location or the video of the specific time to ask questions to annotate the collaborative discussion of the group and completing topic training, etc.

Optimize the design of the teaching mode, combining online and offline learning, individual learning and team learning, breaking the limitations of time and space, and optimizing from knowledge linear transmission to interactive learning mode. Enhance students' subjective initiative in learning, emphasize students as the main body and main participant in the learning process, and let teachers become the organizer of the learning process. Teachers constantly update the teaching content and courseware to improve the practicality of course teaching, enhance students' concentration, and attract students' interest in independent learning before and after class. Increase the interaction between teachers and students and students and students, break the indoctrination teaching method, enhance the learning mode combining group lectures + team seminars and Q&A, and emphasize the two-way interactive teaching of teachers and students based on students' discussion. With the advantage of the digital space platform, improve the frequency and depth of the participation of off-campus experts and enterprise tutors in course teaching, on-campus and off-campus tutors and experts online at any time to connect access, on-site teaching, after class to answer questions no longer subject to the restrictions of time and place, at any time to communicate and interact with the on-campus teachers of the course of study to achieve the "all-time", "long tracking", "long tracking", "long tracking", "long tracking", "long tracking", "long tracking", "long tracking", "long tracking", and "full time". The program is a collaborative effort of "full-time" and "long-tracking".

Building a High-Quality Teaching and Sharing Resource Base for the "Future Learning Center" Model

According to the spirit of promoting the pilot of "Future Learning Center" in the 2023 Work Points of the Department of Higher Education of the Ministry of Education, we will explore the construction of a new intelligent learning environment, build a new high-level platform to meet the needs of precise learning, and provide efficient services for students to learn in the future.

The digital space teacher-student collaboration platform can precipitate teaching experience and data in the teaching process, integrate lesson plans, courseware, exercises, cases, etc. in the database, realize long-term storage of teaching materials, and orderly transmission of inheritance among teachers. Meanwhile, the function of complete data collection and presentation of digital space provides data support for course evaluation and accurate teaching.

In addition, the common construction and sharing of digital teaching resources can break the multiple barriers of different skills, professions, disciplines and industries, and build a "professional-college-intra-school-inter-school-school-enterprise". Diversified construction and sharing of the implementation of the route, so that students can conveniently obtain knowledge and skills from different disciplines, highlighting the cultivation of cross-border thinking ability, comprehensive technical skills, focusing on the use of school and enterprise resources to train students' professionalism and skills and techniques, and comprehensively improve the students' professional design ability and innovative thinking ability.

Enrich the Dimensions of Performance Evaluation and Build Data-Supported Teaching Process Evaluation

Under the traditional teaching mode, students can only be graded by the final examination results and classroom performance after the course. The use of digital space can leave traces of the whole process of pre-study, questioning, group interaction, after-class review, etc., with automatic data statistics and centralized visual display, which facilitates accurate evaluation of students, realizes objective data + subjective assessment, and combines the university and enterprises to jointly formulate the professional evaluation standards, so as to realize the two sides to jointly carry out comprehensive assessment and evaluation of the process of professional talent cultivation and quality, and to establish a multi-dimensional evaluation system of talent cultivation.

Construction of an Assessment and Evaluation System for Whole-Process Professional Skills and Professionalism

Professional ability refers to the ability that must be possessed in order to be competent in a specific occupation, which contains professional skills. It includes professional skills, vocational literacy and career management ability, etc. The evaluation of professional literacy plays an important role of guidance and quality supervision for the implementation of professional literacy education. The Third Plenary Session of the 18th CPC Central Committee proposed to "comprehensively implement the Party's education policy, adhere to the principle of establishing moral character, enhance students' sense of social responsibility, spirit of innovation, and practical ability, and improve students' aesthetic and humanistic qualities. It is necessary to accelerate the construction of modern vocational education system, deepen the integration of industry and education, school-enterprise cooperation, and cultivate high-quality laborers and skilled personnel". Based on the national policy guidance and the basic needs of the society, it is very necessary to establish a complete and implementable assessment and evaluation system of professional skills and vocational literacy on the basis of the traditional assessment methods, combined with the evaluation standards of the schools, enterprises and the society for the teaching of interior design profession with strong practicability. The professional skills and vocational literacy assessment and evaluation system can be accomplished from two aspects: assessment objectives and evaluation methods.

The Assessment Objectives Are Specifically Constructed From Four Aspects: Ideological Literacy, Psychological Literacy, Professional Literacy and Behavioral Literacy

The first is the assessment of students' ideological literacy, including the individual's position, attitude and viewpoint on the principle issues, whether they can do to adhere to the truth, see the slightest knowledge, grasp the trend and so on, as well as the sense of social responsibility, values, and the responsibility of self-behavior and other aspects. Next is the assessment of students' psychological quality: including the degree of interest in professional learning, the vision of the future career and the degree of adaptation to the learning and time environment. Then, students are assessed on their professionalism, including vocational skills, creativity and professionalism. Finally, it is the assessment of students' behavioral literacy including expression ability, teamwork ability and lifelong learning ability.

Establish a Professional Quality Evaluation System That Combines Quantitative and Qualitative Evaluation, Static and Dynamic Evaluation, Result Evaluation and Process Evaluation, and Combines Schools and Enterprises

In order to ensure the teaching effect of interior design, in the course assessment and evaluation, change the single final grading method of teachers in the past, and instead divide the students' course results into two parts: process evaluation and summative evaluation, and take a certain proportion as the final grade. Process evaluation is mainly to evaluate students' learning status in the practical part, including learning attitude, participation in the practical process, and records of practical sessions. And the summative evaluation is mainly to evaluate the completion status of students' learning tasks, that is, to evaluate the quality of the completion of the submitted practical results, the rational use of the work and its value of use and so on. It can be said that the grades of process evaluation are mainly based on the students' learning status; while the summative evaluation is required to be given through the horizontal assessment and the feedback information of the work display. At the same time, in order to make the assessment more fair and reasonable, in the specific course assessment, an assessment group can be set up by other teachers serving in the same specialized course, enterprise experts and so on, to jointly assess the students. And the content of the assessment should focus on the standards and requirements of enterprises, and evaluate the students' design innovation, rationality and ability to solve complex problems comprehensively. In the evaluation method, it can take the combination of students' report, works exhibition, teachers' and enterprises' experts' questioning, students' defense, and teachers' and enterprises' experts' joint review and comment, so as to ensure that the quality of the course teaching is presented comprehensively.

Conclusion

The integration of industry and education emphasizes the close combination of industrial practice and school education, mutual support and mutual promotion, and is an important initiative for applied majors to adapt to social and economic development, realize high-quality teaching and enhance the comprehensive strength of talents. The in-depth implementation of industry-teaching integration and efficient change of talent cultivation mode will surely help the interior design profession to develop steadily, long-lastingly, orderly and innovatively in the new era.

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The Effect of Mathematical Communication, Critical Thinking, and Problem-Solving Skills on Mathematical Concepts Understanding in Indonesia

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Abstract

Mathematics is one of the important subject to be taught to children from an early age. Mathematics concept understanding can shape students' knowledge so as to help in the development of knowledge at a higher level of education. The purpose of this study was to determine the effect of mathematical communication, critical thinking and problem-solving skills on the understanding of mathematical concepts possessed by grade VI elementary school students in Lentera Harapan schools, Indonesia. This study was conducted using a quantitative approach by distributing five test items to 54 students. Instruments are tested valid and reliable. The results found that mathematical communication, critical thinking and problem-solving skills has positive effect on the understanding of mathematical concept.

Keywords: Mathematical Communication Skills, Mathematical Critical Thinking Skills, Problem Solving Skills, Mathematical Concept Understanding

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Introduction

Sarwanto (2021), Nadia (2014), Maria, (2020), and Komariyah, (2018) agreed that mathematics, mother of sciences, is taught to children from an early age. Because it affects children's abilities to think critically, logically, and systematically. Ginanjar (2019) argued elementary school students need to learn mathematical concepts to develop their ability to think creatively, logically, critically, analytically, and systematically. In addition, according to Rusdawati (2019), understanding concepts that are formed from an early age will help students in forming knowledge that will be learned at higher level.

Understanding of mathematical concepts is influenced by many factors. Some students' internal factors are ability to think, motivation, health, learning style. Whereas students' external factors are family, community environments in Unaenah (2019). According to Helma (2017), mathematical understanding is an abstract thinking process using critical reasoning, the ability to solve problems and communicate mathematically, as well as the ability to use mathematical concepts and patterns in everyday life.

In current situation, students' ability to understand mathematical concepts in Indonesia tends to be low. This is indicated by the difficulty students face in solving mathematical questions that are slightly altered from the example teacher has given in Unaenah (2019). Students who cannot solve math problems indicate that they have not been able to understand mathematical concepts thoroughly stated by Radiusman (2020). Based on these problems, the purpose of this study is to examine the effect of mathematical communication, and critical thinking skills on grade VI students' problem-solving skills of mathematical concepts at Lentera Harapan School, Indonesia.

Literature Review

A.   Mathematical Concept Understanding

Mathematical concept understanding means grasping the basic principles, definitions, and operations associated with that concept. It involves knowing what the concept is about, how it works, and being able to perform basic calculations or operations related to it. It is important for students to know the procedure for solving problems. It can be the basis for students to focus on rules or procedures in solving mathematical problems in Tailor (2016). It can speed up to solve the problem. Hanifa (2016) argued that there are three characteristics of a person having a good understanding of concepts. They are the ability to do translation, the ability to interpret and the ability to extrapolate.

B.   Mathematical Communication Skills

According to Yati (2019), mathematical communication is one of the abilities in a person's cognition. It is the ability to convey and explain mathematical ideas appropriately. Mathematical communication can also be interpreted as a skill to explain mathematical concepts to others orally and in writing in Hodiyanto (2017). Mathematical communication skills help students to process and form the meaning of mathematical concepts so that they can be used to associate concepts with one another and explain the concepts in Sammon (2017).

Nurhasanah (2019) stated that the criteria for a person to have good mathematical communication skills are such as having the ability to interpret, solve, and write down problems and the process of solving the problems faced appropriately and systematically. Furthermore, NTCM (2003) argued that there are four criteria in measuring a person's communication skills, namely communicating thoughts in a sequence and clearly to peers and teachers, being able to use mathematical language to explain concepts, being able to use mathematical thinking through the communication process, and being able to analyze mathematical thinking appropriately. In conclusion, to have good communication skills, it is necessary to look at the following indicators, namely (1) Composing and connecting his mathematical thoughts through communication, (2) Communicate thoughts sequentially and clearly to peers and teachers.

C.　　Mathematical Critical Thinking Skills

Siswanto (2020) explained that mathematical critical thinking is the ability to analyze, process, and integrate received information so that it can provide logical and relevant conclusions. According to Fasha (2018). It shapes students' readiness to think at a more difficult and abstract level. Anugraheni (2018) stated that children can develop their mathematical critical thinking skills from an early age and can be formed in any mathematics learning planning at the elementary school level.

Ridlo (2020) proposed that the criteria in measuring a child's mathematical critical thinking skills are: (1) can provide a simple explanation, (2) can make a basic decision, (3) can conclude information, (4) can provide further explanation. Siswono (2020) and Facione (2015) agreed that there are six indicators of critical thinking, namely (1) interpretation consisting of categorization, decoding, signification, and clarifying a meaning, (2) analysis which is the ability to identify, examine, and analyze arguments or ideas, (3) evaluation which means an ability to assess the arguments given, (4) conclusion, meaning students have alternative thoughts and can draw a logical conclusion, (5) Explanation which means being able to state the results of thoughts using the right methods and procedures, (6) Regulation which means the ability to provide appropriate results and make appropriate assessments of procedures. Therefore, a person can be said to have good mathematical critical thinking skills if he or she can identify and formulate the problem, analyse information based on given data, provide conclusions from existing information.

D.　　Mathematical Problem-Solving Skills

According to Bariyyah (2021), mathematical problem-solving skills are the abilities to identify problems, search and select various alternative solutions and make decisions in solving all the problems at hand. NTCM (2003) claimed that there are characteristics of a student who has mathematical problem-solving skills, namely (1) can apply various problem-solving strategies, (2) can use mathematical concepts in different situations, (3) can build new knowledge from the problem-solving process carried out, (4) can reflect on the problem-solving process. Polya (2004) also explained that there are four characteristics in measuring a person's problem-solving skills, namely: understanding the problem correctly, compiling problem-solving steps, taking steps to solve the problem correctly, double-checking every information and calculations made. In this research the indicators of problem-solving skills are mathematical communication skills and mathematical critical thinking skills.

Methodology

A.   Instruments Design

Three independent variables are going to be measured. They are Mathematical communication skill (X_1), Mathematical Critical Thinking Skill (X_2), and Mathematical Problem-Solving Skills (X_3). One dependent variable called Mathematical Concept Understanding (Y). These independent variables are measured by using three instruments called Mathematical Communication Skill, Mathematical Critical Thinking Skill, and Mathematical Problem-Solving Skills. These instruments are constructed through a test instrument that consisting of five essay questions. The dependent variable is measured by averaging all mathematics test score within that semester. Design of the three Instruments are shows at Table I for X_1, Table II for X_2 and Table III for X_3. Score on brackets on each item indicates the maximum score on that item if students answer correctly.

TABLE I: MATHEMATICAL COMMUNICATION SKILLS INSTRUMENT

Indicators	Description	Numbers
Composing and connecting his mathematical thoughts through communication	Students can identify as well as compile existing information in writing for use in work steps	1a (20) 1b (20)
Communicate thoughts sequentially and clearly to peers and teachers	Students can communicate in writing the correct sequence of solving given math problems	3a (30) 4a (30)

TABLE II: MATHEMATICAL CRITICAL THINKING SKILLS INSTRUMENT

Indicators	Description	Question numbers
Formulate a problem from the questions given	Students can write down the questions asked from the questions correctly	2a (20) 2b (20)
Analyze information based on data, idea, and concepts	Students can write down everything they know about the problem correcly	3b (20) 4b (20)
Provide conclusions from existing information	Student can write the conculation of the problem solving	5 (20)

TABLE III: PROBLEM SOLVING SKILLS INSTRUMENT

Indicators	Description	Question numbers
Mathematical communication skills	Student can write the problem correcly	1a (10), 1b (10) 3a (15), 4a (15)
Mathematical critical thinking skills	Students can identify the right operations to solve the problems	2a (10), 2b (10) 3b (10), 4b (10) 5 (10)

B.   Population and Sample

This research was conducted in elementary schools in Tangerang Regency. The population of this study was 57 grade VI elementary school students in two classes. However, at the time of data was collected, the number of samples became 54 students because three students from class B were absent due to illness. The complete data in this study was tabulated at Table IV. and Descriptive data are tabulated at Table V.

C.   *Validity and Reliability of Instruments*

The three instruments should be tested whether they are valid and reliable. Validity and reliability test of Mathematical communication skills instruments is shown at Table VI. The standard correlation for 54 respondents with confidence interval 95% is 0.27 then it can be concluded that the instruments are valid and reliable. Other instruments, Mathematical critical thinking skill, and Mathematical problem-solving skills are found valid and reliable with Cronbach alpha equals to 0.68, and 0.83 respectively.

TABLE IV: EXPERIMENT DATA

Resp	X_1	X_2	X_3	Y	Resp	X_1	X_2	X_3	Y
1	52	57	54	64	28	87	100	93	100
2	90	73	82	68	29	67	77	72	60
3	67	77	72	70	30	58	52	55	50
4	58	52	55	40	31	46	72	59	52
5	52	77	64	68	32	43	67	55	50
6	85	70	78	66	33	33	73	53	80
7	24	32	28	48	34	54	78	66	100
8	80	67	73	74	35	93	70	82	76
9	100	100	100	72	36	93	100	97	92
10	100	60	80	60	37	66	62	64	68
11	75	83	79	42	38	58	77	68	88
12	100	100	100	100	39	100	100	100	95
13	59	42	50	68	40	68	48	58	50
14	38	67	53	44	41	100	90	95	100
15	10	47	28	48	42	40	40	40	68
16	69	68	69	100	43	77	93	85	72
17	67	77	72	72	44	37	57	47	68
18	100	80	90	100	45	48	83	66	68
19	65	27	46	78	46	31	72	51	65
20	100	100	100	78	47	100	100	100	78
21	59	72	65	68	48	85	90	88	66
22	37	47	42	68	49	63	93	78	78
23	58	62	60	70	50	90	93	92	100
24	67	87	77	74	51	66	75	70	72
25	90	83	87	78	52	75	53	64	78
26	73	100	87	70	53	80	87	83	52
27	77	73	75	72	54	53	87	70	70

TABLE V: DESCRIPTIVE DATA OF EXPERIMENT

Variable	X_1	X_2	X_3	Y
Minimum	10	27	28	40
Maximum	100	100	100	100
Mean	67.79	73.42	70.61	71.41
Median	66.67	74.17	71.04	70.00
Mode	100	100	100	68

TABLE VI: Validity and Reliability Test for Mathematical Communication Skills Instruments

Remark	1a	1b	3a	4a	X_1
Correlation	0.91	0.86	0.43	0.36	
Variance	132.73	89.85	55.33	47.81	714.83
Cronbach Alpha			0.73		

Result and Discussion

Data distribution of X_1, X_2 and X_3 are tested using Chi-square test. They are normal distribution. The frequency distribution data of X_3 is depicted in Fig. 1. The blue bar is the actual data of that interval whereas the orange bar indicates the frequency expectation data to be normal distribution. Regression analysis is used to see the effect between the three independent variables, X_1, X_2 and X_3 on dependent variable Y.
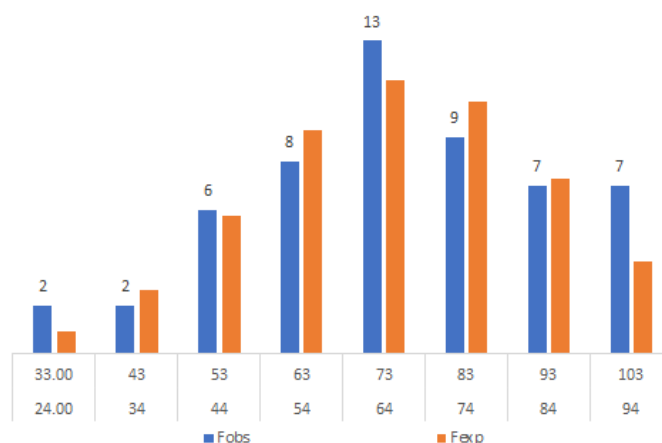
Figure 1. Students' Problem-Solving Skills Distribution

Testing for hypotheses is performed using linier regression tests. The effect of students' Mathematical communication skills on their mathematics concept understanding is stated in equation (1) and the Anova table is presented at Table VII.

$$Y = 47.13 + 0.36X_1 \dots\dots(1)$$

TABLE VII: Anova table of Mathematical Communication Skills toward Mathematical Concept Understanding

	DF	SS	MS	Fcal	Sig
Regression	1	3459.16	3459.16	17.56	0.00
Residual Error	52	10243.88	197.00	-	-
Total	53	13703.04	-	-	-

It is proven that Students' Mathematical Communication skill has a positive effect on their mathematical concept understanding. The R square coefficient is 0.25. It means that Mathematical Communication skill has influence 25 % of the students' Mathematical concept understanding. This finding is also supported in Pradipta (2018). Therefore, Students' ability to communicate his or her mathematically thoughts has a positive influence on their understanding of mathematical concepts.

The result is also applied for Students' Mathematical critical thinking skill has a positive effect on their Mathematical concept understanding. The R square coefficient is 0.23. The linier regression equations is stated in equation (2).

$$Y = 41.58 + 0.41X_2 \quad\text{...(2)}$$

This finding is also stated by Belanisa (2019). Belanisa explained that students with good critical thinking skills will be able to understand and master mathematical concepts clearly and well. These skills are used by students to analyze, process, connect that evaluate the concepts learned critically and rationally. This thinking pattern helps students understand and strengthen their understanding of mathematical concepts.

Further test has the same result that students' Problem-solving skills has positive effect on their mathematical concepts understanding. The R square coefficient is 0.30 and the regression equations is in (3).

$$Y = 37.91 + 0.47X_3 \quad\text{...(3)}$$

Similar findings were also found by Suraji (2018). They explained that the problem-solving skills influences positively on the mastery of the concepts.

Conclusion

Based on the results of data processing and analysis, it can be concluded that mathematical communication skills, mathematical critical thinking skills, and mathematical problem-solving skills have a positive effect on the mathematical concepts understanding of grade VI elementary school students. The better students can actively communicate, think critically and logically, solve mathematical problems then the better it will help students to have better mathematical concept understanding.

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Lab Rotation Blended Learning Model in Promoting Computational and Critical Thinking: An Assessment of Multiple Stakeholder Needs

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Abstract

Understanding the needs are one of the learning success determinants that can assist in an efficient and targeted learning process. The more parties who participate resulted the more comprehensive understanding of it. We aim to identify multiparty needs for the lab rotation model to fostering computational and critical thinking skills. Participants were 49 students, 3 graduates, 3 instructors, and 1 management representative. Data was gathered through interviews on the use of blended learning at each station of rotation model. While the questionnaire was only for students. We noticed that: (1) statistics learning strategy emphasizes teacher-centered and face-to-face learning. (2) incorporating a range of activities is critical since it keeps students interested, greater than single activities, and less stressful. (3) computational thinking could be improved by using step-by-step instruction, creating connections between each material component, and using a flowchart or mind mapping. Meanwhile, the critical thinking could be improved by conducting spontaneous exams, asking student involvement, rewarding them, etc. While descriptive analysis revealed that students tend to agree, 92% (45) that the lab rotation model activity should be employed, while 4% (2) disagreed. Student expected that needing more learning activities and rewarding. It means, learning activities using the lab rotation model meet the participants needs, which consists of initial learning station (ILS), traditional learning station (TLS), individual practice station (IPS), group learning station (GLS), and final learning station (FLS). In response, the learning process can employ the lab rotation model.

Keywords: Blended Learning, Lab Rotation Model, Computational, Critical Thinking, Needs Assessment

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Introduction

One strategy to improve learning effectiveness is to employ the blended learning method. Several prior research have demonstrated that this technique was beneficial as a learning design (Ayob et al., 2020; Govindaraj & Silverajah, 2017). It highlights higher level thinking (Christina et al., 2019; Nederveld & Berge, 2015), as well as demonstrated active learning (Wichadee, 2017). This strategy involves the use of two learning models: traditional or face-to-face learning and online learning.

Students in the online learning can communicate with both their classmates and instructors by a camera, chat, or microphone. They can interact with each other in the same way that they would in a traditional classroom setting. Even while the combination of these two ways was in line with advances in information technology, it still faced several obstacles, notably those related to the learning habit through the online method, which is still relatively new, particularly for students from the city's borders. Interaction with camera assistance cannot be maximized due to unstable internet connections, limited internet quotas, doing something else while studying, and psychological issues such as lack of confidence, feeling uncomfortable while studying, and experiencing anxiety and stress (Alim et al., 2022).

However, virtual involvement cannot perfectly replicate the interaction process of a traditional class. It demands longer to shift the perspective of learning in line with the growth of the times as it is today, and equalization of internet network access must be increased significantly. As a result, this study focuses on the needs among various parties (students, alumni, instructors, and management representatives) to determine whether their thoughts and needs are connected to the use of blended learning methods, particularly in the statistics course. Additionally, we are exploring the viewpoints of instructors and management representatives, particularly in relation to learning approaches that might maximize students' computational and critical thinking. It will then be included into the learning process via the lab rotation blended learning framework.

Need assessments were used to gather detailed information about appropriate learning models. This evaluation involves several parties with varying capacities. At each learning station, they will take part in a series of activities to determine their thoughts about the importance of implementing the lab rotation model in statistical learning.
- Initial Learning Station (ILS): This station emphasizes self-study activities. This station is an out-of-class activity and uses a variety of learning sources, e.g., videos, journals, etc.
- Traditional Learning Station (TLS): Traditional or face-to-face learning approaches.
- Individual Practice Station (IPS): this station stresses on an independent practice, during class time at students' own pace (synchronous learning).
- Group Learning Station (GLS): It is the discussion process by conduct focus group discussions (FGD). This technique will improve students' social skills as well as their capacity to express themselves independently.
- Final Learning Station (FLS): This is the last station that students will experience in a traditional class. This station is led by an instructor. The instructor concludes the session and completes the activity by conducting evaluation process.

The implementation of the lab rotation model can assist students in quickly grasping the content. This method favors higher order thinking over lower-level thinking. As a result, it is intended that this strategy would be able to promote students' computational and critical

thinking, which are two forms of higher order thinking skills. This will then assist students in comprehending the subject offered. Furthermore, it allowed students to engage in several diverse learning experiences, both in terms of learning activities and from the perspectives of various instructors. Further, learning activities based on the lab rotation model approach can accommodate students' diverse learning characteristics. As a result, this technique will serve as a complete learning model.

We would undertake a needs assessment of various stakeholders involved in the educational process. This is essentially required to gain an accurate image of needs for the use of lab rotation model in statistics courses and its relationship to students' computational and critical thinking skill.

Method

Participants were divided into four categories: 49 students, 3 alumni, 3 statistics instructors and 1 management representative. Two methods are used to collect data: questionnaires and interviews. The questionnaire uses a five-point Likert scale. The questionnaire and interview cover the general concept of the lab rotation model. The quantitative approach would be used to investigate the needs of students and concludes with a descriptive analysis. 31 items were used to determine the needs of students for the lab rotation model. The validity analysis revealed that the validity index was in the range of 0.67 - 1.0 with reliability reached 0.90.

The questionnaire would be distributed via Google form for students, using anonymous identity to ensure the participants would be more open in providing the necessary information. While alumni, instructors, and management representative were interviewed. The quantitative data analysis focuses only on identifying the patterns of students' responses to the lab rotation model, which is presented in numerous learning stations.

Meanwhile, qualitative data analysis focuses on the significance of implementing the lab rotation model. Interview focused on: (1) How is the learning model used in current statistics lectures? (2) Is it important to include numerous activities for learning into statistics classes? (3) Is it possible to use blended learning in statistics classes? (4) How do you respond if students are instructed to study independently before joining class? (5) How do you respond when students practice independently after getting a lecture? (6) How are the ways to encourage computational and critical thinking among students during lectures? (7) What is the statistical learning model that you have gone through? (For alumni); (8) What are your expectations for the statistical learning model? (For alumni).

Result

1.　*Qualitative Approach*

The first stage, instructors and management representation were interviewed. They stated that the statistical learning process continues to use the traditional strategy, namely instructor-centered rather than student-centered. Sometimes online by synchronous and giving assistance outside class hours. They are explaining theory first, then practice to the end of the semester. To keep students interested, it needs to include more different learning activities in which students can actively engage, which could reduce feelings of monotony in lectures. The use of blended learning is important demanded because it is in accordance with government recommendations as well as the present situation. Furthermore, individual study

assignments must be completed before students attend class. Students will benefit from this since they will be able to grasp the content more easily.

Meanwhile, individual practice tasks can be completed immediately after the content is presented so that students do not forget the fundamental principles of the content. Moreover, students require gatherings to talk with their classmates to comprehend each other's points of view. Students will compare their views of earlier lessons they have learned. Computational thinking can be encouraged by describing the subject being taught step by step, explaining the relationship between each component, providing crucial questions that encourage them to find solutions to problems, explaining by using a flowchart or mind mapping, focusing on a single aspect before going on to the next. Meanwhile, critical thinking can be stimulated by asking critical questions, requesting student feedback on the content being taught, giving a spontaneous quiz, encouraging students to engage more actively, ask them crucial questions that push them to think, give rewards to stimulate them, etc.

The second stage, alumni were interviewed about their experiences when studying statistics. They mentioned that the statistical learning model that have gone through included tutoring, presentation, the same learning model as previously, etc. While students' expectation included: practicing soon after learning the theory to avoid forgetting, including additional learning activities to avoid bored, discussing in group to exchange understanding with other classmates, providing a great reward to encourage learning motivation.

2.   *Quantitative Approach*

In total, 49 students responded the questionnaire that contained various elements, including the components of the lab rotation model as a learning strategy and the blended learning concept in general – see Table 1.

Needs	Items	5	4	3	2	1
B L	Material presentation, both online and offline, should be tailored to the characteristics of the material.	18 (37%)	31 (63%)	0	0	0
	The main material should be presented offline, but more detailed information can be presented online.	15 (31%)	22 (45%)	7 (15%)	5 (9%)	0
	The combination of online and offline instruction can improve the effectiveness of lectures.	10 (21%)	21 (43%)	13 (26%)	4 (8%)	1 (2%)
	The learning experience will be enhanced if the learning process includes a variety of activities	18 (37%)	22 (45%)	8 (16%)	1 (2%)	0
I L S	I feel it necessary to study independently before attending class.	11 (23%)	30 (61%)	8 (16%)	0	0
	When I have studied the material to be taught, I understand the lesson better.	12 (25%)	29 (60%)	7 (13%)	0	1 (2%)
	I believe it is critical to prepare myself before joining the class.	13 (26%)	29 (60%)	6 (12%)	0	1 (2%)
	Studying prior class allows me to think more critically about the material that will be discussed in the class.	11 (23%)	30 (61%)	7 (14%)	1 (2%)	0
	I understand course material more systematically when I study before attending lectures.	12 (25%)	32 (65%)	5 (10%)	0	0
T L S	I still need the instructor to explain the material that I have studied on my own.	31 (63%)	12 (25%)	6 (12%)	0	0
	Instructors' guidance can help me better understand the material I've already studied.	29 (60%)	19 (38%)	1 (2%)	0	0
	Face-to-face classes are still necessary in today's learning environment.	28 (57%)	17 (35%)	4 (8%)	0	0
	Lecturer's explanation in face-to-face lectures can stimulate my critical thinking skills.	18 (37%)	25 (51%)	6 (12%)	0	0

Needs	Items	5	4	3	2	1
	Face-to-face learning model assists me in systematically understanding the material.	23 (47%)	25 (51%)	1 (2%)	0	0
I P S	There should be a separate time set aside for independent practice activity.	12 (25%)	25 (51%)	11 (22%)	1 (2%)	0
	I need to put into practice what I've learned.	15 (31%)	26 (53%)	8 (16%)	0	0
	Independent practice activities help me better understand the course content.	6 (12%)	26 (53%)	16 (33%)	1 (2%)	0
	Practice is essential as a supplement to the material covered in class.	15 (31%)	26 (53%)	8 (16%)	0	0
	Independent practice can encourage me to be more critical of the material I have learned.	4 (8%)	29 (59%)	15 (31%)	1 (2%)	0
	Independent practice enabled me to establish a step-by-step plan for completing the lecture assignments.	6 (12%)	27 (55%)	12 (24%)	3 (6%)	1 (2%)
G L S	I understand the course material better when I discuss it in groups.	10 (21%)	26 (53%)	12 (24%)	0	1 (2%)
	When I discuss the topic in groups, I can learn a lot of new things.	17 (35%)	25 (51%)	6 (12%)	0	1 (2%)
	Discussion in the group helps me understand my friends' perspectives.	13 (26%)	30 (61%)	5 (10%)	1 (2%)	0
	Group discussions allow me to express myself more directly.	13 (26%)	30 (61%)	5 (10%)	0	1 (2%)
	Group discussions can help me better understand material.	5 (10%)	24 (49%)	18 (37%)	1 (2%)	1 (2%)
F L S	The instructor should provide conclusions on each material that has been taught at the end of the lecture.	21 (43%)	24 (49%)	4 (8%)	0	0
	The instructor should place emphasis on material that is deemed important to know.	20 (41%)	22 (45%)	7 (14%)	0	0
	The instructor's conclusion at the end of the lecture helped me better understand the material that had been studied.	15 (31%)	24 (49%)	10 (20%)	0	0
	The lecturer's conclusions at the end of the lecture helped me see the importance of the lecture material that I had studied.	16 (33%)	26 (53%)	7 (14%)	0	0
	Lecture's conclusion was able to make me see important points related to the material that had been studied.	17 (35%)	26 (53%)	6 (12%)	0	0

Note: 5= Strongly agree, 4= agree, 3= neutral, 2= disagree, 1= strongly disagree.

Table 1: The Distribution of Students Needs

Based on the findings above, it is possible to conclude that learning activities using the lab rotation model (LRM) approach met the needs of the participants, which consists of five components: initial learning station (ILS), traditional learning station (TLS), individual practice station (IPS), group learning station (GLS), and final learning station (FLS).

Discussion

The present statistical learning technique is based on classical learning concepts and is usually performed offline. Learning with a blended approach is still not well implemented due to insufficient infrastructure support and students' learning preferences, which still necessitate face-to-face interactions. Blended learning has been used, particularly during the Covid-19 period. However, the learning process resumed as it had previously. Meanwhile, online learning is only done when it was needed. The use of a blended learning type lab rotation paradigm has occurred, but not in a systematic manner. The instructors only use a combination of online and offline learning without a specific learning structure.

All stakeholders agree that it is critical to incorporate a variety of learning activities into statistics classes. This has never been done before in the prior learning process; thus, it is

novel. It will improve students' understanding, keep them interested, will be more pleasurable and less stressful. As a result, students will not be restricted to boring tasks in the classroom but will be able to learn freely outside of the classroom. Students will benefit from the use of blended learning. They are given the freedom to learn while yet receiving virtual instruction. However, students still need face-to-face contact in offline classrooms, particularly for subjects that require substantial explanation and during the first meeting. It is important to familiarize instructors and students at the first lecture meeting. Online learning can take place after the primary subject matter has been explained that can be monitored by using video camera. The initial meeting is critical for establishing a psychological connection between the instructor and the students (Alim et al., 2023).

Students are also advised to study individually before coming to the class. Students who succeed are more conscious of autonomous study than those who do not. Meanwhile, they can perform a surprise quiz or ask random questions at the beginning of each lecture session to verify they have completed their own learning process. This greatly enhances student understanding of the content that will be presented. Student enthusiasm to actively participate in the independent learning process is a measure of student engagement in the lecture process. Students who have studied independently can be identified by their ability to respond the questions or involve in the class. In addition, they will raise questions or assist their peers who do not comprehend the topic being taught. Following that, students should practice independently after receiving a lecture so that the content may be implemented immediately rather than waiting until the end of semester. This reduces the likelihood of forgetting the content. To support students in carrying out the data analysis process independently, independent practical activities must be overseen by instructors or teaching assistant.

Meanwhile, one technique to stimulate critical thinking among students are to ask them questions that should be addressed scientifically, offering students unexpected quizzes or examinations, comparing multiple viewpoints on a subject and select the most appropriate opinion logically. Instructors might also ask student comments on content presented by instructors or other students. To keep students' critical thinking skills sharply it is vital to recognize students who are critical and actively participate, as well as continuing to push other students to be more involved in the following meeting. Furthermore, stimulating computational thinking may be accomplished by studying in stages, or by focusing on one problem before moving on to the next. This may also be done with the use of mind mapping or graphics to fully comprehend the situation. A problem's execution pattern can also be carried out gradually and systematically. Create a relationship between each content component so that students may grasp the relationship between each subject.

According to students who have attended statistics classes, the learning method so far still prioritizes teacher-centered rather than student-centered learning. This is inextricably linked to a lack of activities that might drive students to carry out activities autonomously and monotonously, as is typical in traditional courses. This may be remedied by introducing various types of learning stations, and it is intended that students would engage in more active learning than lecturers. Meanwhile, students wish to be able to practice soon after learning the theory to prevent forgetting. Students are also expecting including extra learning exercises to minimize boredom, talking in groups to exchange understanding with other students, and delivering a fantastic incentive to promote learning motivation.

The conclusions of the interview session were consistent with the findings of the questionnaire, in which every facet of the lab rotation model was positively addressed. As an

example, consider the importance of integrating blended learning in statistics courses, which is comprised of numerous claims (see table 1). The average student reaction is positive, with the majority agreeing. It suggests that students responded favorably to the use of the blended learning model when paired with the lab rotation model, particularly in statistics courses. This trend can be seen at each lab rotation model learning station, indicating that students are enthusiastic about using this model in statistics. Based on the data presented above, we can infer that using the lab rotation model in statistics learning may meet the needs of students and is supported by stakeholders engaged in the learning process.

Conclusion

The implementation of the lab rotation model in statistics was in acceptance with the needs of the stakeholders. Activities in each station tailored to stakeholders needs, such as studying before class, face-to-face meeting, online individual practicums, focus group discussion, and conclusions. Some of these activities have been implemented, although not consistently. Learning activities using a blended learning approach were only carried out when there was an urgent necessity.

Meanwhile, on the instructor side, instructors continue to promote teacher-centered learning rather than student-centered learning. However, face-to-face interactions were still required by stakeholders rather than fully online learning. Blended learning is supposed to make statistics easier to grasp. This strategy is intended to encourage students to use their computational and critical thinking skills. Future study can use this learning technique for another subject.

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Community Based Learning in Business Education: Is It Effective and What Are the Challenges?

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Abstract

Community Based Learning has been practiced by Higher Education Institution in Malaysia with the aspiration to produce graduates who are capable to apply the theories and concepts to real-life context. However, there has been little information about its' effectiveness. This study intends to investigate the effectiveness of Community Based Learning in Business Program particularly the capstone project in Business Program offered by Polytechnic Malaysia and the challenges faced by the students. The qualitative method is employed to gather the reflections on the process and outcome of the experience via interviews with 36 students from 2 cohorts. Thematic analysis is used to interpret the data and the findings show that the capstone project activates the learning outcomes of academic knowledge, general skills, practical competencies, personal growth and civic responsibility while lack of resources and self-incompetence are the two main challenges faced by students. The findings of this study offer insights into the process of aligning related policy with Community Based Learning as well as demonstrating support for Community Based Learning.

Keywords: Community-Based Learning, Capstone Project, Effectiveness of Capstone Project

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Introduction

Community-Based Learning (CBL) is a form of learning that enables students, in collaboration with local businesses, to directly address identified real-life issues related to their course subject. By putting their theoretical knowledge into practice, CBL students not only help the firms achieve their goals and missions but also help them build transferable abilities and become more prepared for the real world. This helps them gain experience and talents that will be useful in their future undertakings. Students who engage in this kind of learning have the chance to learn in non-traditional academic settings and gain practical experience in their chosen fields and future professions. Students collaborate in small groups to find creative answers to actual business challenges while also learning important lessons about the duties and demands of the working world. This provides an opportunity for students to demonstrate their leadership and management abilities and comprehend the effects of their choices in a "safe space".

The higher education institutions in Malaysia have been using community-based learning (CBL) as one of their teaching and learning methodologies with the goal of producing graduates who can apply theories and concepts to real-life situations in conjunction with the Malaysian Educational Blueprint (MEB) 2015–2025, which lays out the principles that higher education institutions must follow in order to generate graduates who can compete on a global scale and meet the needs of stakeholders in Malaysia. Higher education institutions in Malaysia have used a variety of approaches to implement community-based learning, including problem-based learning, project-based learning, community case studies, learning via volunteer work, discipline-based projects, and capstone projects (Maharam et al., 2019). These different approaches have been employed in courses that have been integrated, embedded, stand-alone, or infused.

When students graduate from higher education institutions and enter the workforce, they should be prepared with the necessary knowledge and skills. In business-related programs, this means knowing the technical skills and information required by the industry, as well as the business theories and concepts. Through the capstone project—a community-based learning that combines service learning and problem-based learning—Polytechnics in Malaysia, as TVET providers, give students the chance to apply the material they have learned in class to a real-world scenario, complete with the limitations and uncertainties inherent in practice. In this project, students not only apply the knowledge they have learned in a course but also assist the community partners, especially the small and medium enterprises.

The capstone project is a final assignment intended to evaluate the abilities, know-how, and proficiency that students have developed. It is the culminating experience of academic life, as the name implies, and occurs prior to graduation. All students are expected to complete the project because it provides them with the final credits needed to pass the course. Students must integrate relevant service work in the business community with the knowledge they have gained throughout their coursework for their capstone project. The goal is either exploring a new topic or synthesizing students' understanding of their discipline. Such a project could be as basic as conducting topic research, analyzing a novel approach or method, creating a business plan, investigating historical figures or events, or even coming up with the idea for a tool, product, or service. In addition to creating the written report, a capstone project presentation functions as a sort of exposition where the students showcase their project and demonstrate their preparedness to enter the business world.

Numerous tertiary education institutions have started offering capstone courses due to the widespread recognition of these programs as effective means of imparting knowledge and skills that are relevant to the workplace. As a result, a lot of study on capstone courses and their effects has been conducted. However, there has been little information about its' effectiveness from the perspective of students. Hence, this study intends to provide a coherent and compact view of business capstones by investigating the effectiveness of community-based learning in business programs, particularly the capstone project in business programs, from the students' perspective and also the challenges faced by the students.

Literature Review

Giving students hands-on experience with the tools, approaches, concepts, and best practices that are taught in previous courses more conceptually is the main goal of a capstone project. However, the majority of research on capstone design courses has focused primarily on course outcomes, pedagogy, structure, and assessment (Badir et al., 2023). Limited studies have addressed the perspectives of students with respect to the benefits of capstone courses. For instance, recent studies have linked community-based learning to a number of advantages, including increased student learning (Yusof et al., 2020) and practical experience (Meyer et al., 2016); civic engagement and the reciprocal relationship between campus and community (Olberding and Hacker, 2015); enhanced student civic leadership and social responsibility (Weiler et al., 2013); and deeper comprehension of course contents (Dienhart et al., 2016).

According to Carlisle et al. (2020), there is positive evidence supporting the integration of learning and community. This is particularly true in light of the fresh skill set that the students acquired on a personal and professional level, improving their sense of self-worth, social confidence, and public participation. In support, Arcos-Alonso et al. (2021) postulate that community-based learning improves students' learning effectiveness because they utilize the knowledge they acquire in the classroom to subsequently translate it into community contributions. This maintains their personal development and creates a bond of knowledge about the changing world. In addition, a recent study further reveals that students expressed a stronger sense of responsibility for their education and an appreciation for the long-term benefits of interacting with community partners (Goggins and Hajdukiewicz, 2022), while Shah et al. (2023) add to the literature by showing that community-based learning promotes students' understanding in a "real-world" context within the community (as a subset of workplace learning) and "beyond the confines of a university degree" in addition to helping them gain important employability skills through a workplace learning experience. Another noteworthy finding is by Hamzah et al. (2023), who demonstrate that the students were being prepared on how to handle interactions with other stakeholders. The skills needed, such as leadership and communication skills that are crucial for social interactions, were developed during this period.

Research Methodology

The aim of the study was to understand the students' perceptions of whether the capstone course is beneficial and what the challenges are. In order to gain in-depth insights, the qualitative method was employed. Individual in-depth interviews lasting approximately 20–30 minutes were conducted at Politeknik Kuching Sarawak in Malaysia. The questions centered on students' experiences in the capstone course in terms of the benefits they believed they gained and the challenges they encountered. The Business Project is a core

component in the final year of the three-year-long Diploma in Business Studies program. A total of 36 students from two cohorts were sought until saturation was achieved. Interviews were recorded, transcribed, and coded. Major themes were identified. The method of peer debriefing was employed to validate the coding framework and analysis of the findings, in which initial codes and preliminary themes were discussed with the entire research team. This method adheres to the RATS (relevance, appropriateness, transparency, and soundness) criteria for qualitative research.

Findings and Discussions

The thematic areas can be grouped into two broad categories: the perceived benefits of capstone projects by students and the challenges faced by students in capstone projects. A total of four themes emerged from the analysis of perceived benefits of capstone projects by students: (i) activating the learning outcomes of academic knowledge; (ii) promoting generic skills; (iii) sharpening practical competencies; and (iv) fostering personal growth and civic responsibility.

(i)   Activating the Learning Outcomes of Academic Knowledge

The capstone project helps students assess their competency and preparedness and acts as a culminating intellectual and academic experience for them. It requires students to apply the knowledge and abilities they have learned during their studies while working independently on a subject or issue that the firms are facing. The students also indicate that they gained higher generalized self-efficacy and skills via capstone projects when compared to the traditional course. The respondents highlighted that the capstone project involves students identifying problems in the real business world. They are then challenged to come up with solutions for the issue by conducting a thorough study and analyzing all of the available data to generate possible solutions for the problem. The respondents perceived the capstone project as an opportunity to collaborate on a project that calls for them to use the information and abilities they have gained in their individual subjects of study. Important topics covered in the course include problem-solving, communication, team building, project management, and project planning.

(ii)   Promoting Generic Skills

Students have to communicate with small and medium enterprises as part of the capstone course. Despite the fact that they had dealt with the community via other activities, a number of them noted that the communication style in the capstone course was different. Students conducted interviews to ascertain the enterprise's needs and negotiate the project scope. They also showcased their ideas to the enterprise during the project. The respondents thought that these skills had improved as a result of the capstone course. Many respondents mentioned that the project had been their first chance to communicate with a genuine client and that it had given them lots of opportunities to learn.

Students who complete a capstone project are better able to lead others and function successfully in a group. They communicate with others both orally and nonverbally for a variety of reasons, and they use a variety of media to convey ideas and convey meaning. Additionally, they acquire information, research concepts, and express their thoughts through the use of information and communication technologies. The respondents indicated that in order to identify an issue, create and carry out a project plan, and effectively communicate

their results, they must collaborate in teams. An effective communication strategy is also emphasized in a capstone project course, both with internal team members and external stakeholders. Students gain the teamwork, leadership, and critical thinking abilities necessary for success in their future occupations through this course.

(iii)   Sharpening Practical Competencies

Students have the chance to work on an analytics project in the real business world during their capstone course. Through their interactions with business stakeholders and their successful completion of team-based business analytics projects within a commercial firm using the firm's data, the students obtained actual experience in delivering self-directed and experiential learning. The capstone project is also intended to test students' critical thinking abilities, help them solve challenging issues, and show that they are prepared for jobs in their profession. It is frequently the high point of their academic career and can give them experience and abilities that will be useful in their future undertakings.

Apart from that, capstone projects require independent thought, time management, and self-direction. Students learn critical thinking, communication, flexibility, and project management through planning, carrying out, and commenting on their projects. It is noteworthy to highlight that the respondents perceived that, in contrast to standard exams or theoretical assignments, through this practical experience, they are able to close the gap between theory and practice, improving their ability to solve problems and getting ready for whatever obstacles they may face in the workplace in the future.

(iv)   Fostering Personal Growth and Civic Responsibility

The capstone project encourages students to plan their future more thoughtfully, identify their primary goals, explore career options, and get practical experience that will benefit them in the workplace. It is a relatively new approach to the typical "placement" or "internship," and it aids students in navigating their careers on a certain path. When students are given the opportunity to apply what they have learned in the classroom, they not only discover their own personal strengths and acquire a set of transferrable abilities, but they also gain professional knowledge from working with community partners. It also boosts personal inspiration, as these kinds of tasks necessitate creative effort on subjects that each person finds fascinating, which increases inspiration. The respondents also indicated that the capstone project provides them with the opportunity to realize their potential as first-time managers by enabling them to make decisions in the real world. This has resulted in a sense of accomplishment and pride in their achievements, as they have the opportunity to showcase their knowledge and skills to a wider audience, including lecturers, peers, and potential employers.

Through the capstone project activities, students also develop an inclusive and open view of the world around them by learning about other cultures and encouraging respect for those who are different from them. They can also speak with people who hold opinions and views that differ from their own. Besides, it also teaches students how to positively impact society, giving them greater confidence and clarifying their self-perception. In the end, these advantages help students develop into well-rounded individuals who not only have confidence in themselves but also work to improve the environment in which they live.

As for challenges faced by students, two themes have been identified: (i) lack of resources and (ii) self-incompetence.

(i)   Lack of Resources

Creating a successful solution for the capstone project that satisfies the objectives of the community partner and learning requires a lot of valuable effort. Success is less probable if logistical issues with scheduling, transportation, or communicating get worse. Inadequate support and direction from the community partners also contribute to the challenges encountered by the students. In this regard, the students faced difficulties connecting and communicating with their community counterparts in order to build ideas and consult with the community on its concerns. As a result, there may be instances while working with the community that present difficulties for lecturers and students since diverse viewpoints and understandings of the problems that call for certain solutions exist on both sides.

(ii)   Self-Incompetence

Notwithstanding the benefits of a capstone project, it is necessary to take into account the students' readiness to conduct the capstone project. Students may not be prepared well enough to complete a capstone project successfully, and this will limit the learning experience as well as fail to help their community partner. Failure can occur in any educational environment, but it can be especially concerning and more worrisome for educators and students because of the responsibilities they may have to community partners. Students were unable to optimize their knowledge and skills learned, especially if their lecturers did not have the experience to help them connect to real-world business scenarios. Unforeseen obstacles may be encountered that limit the project outcome in some way in the context of real-world complexities and challenges.

Conclusion

The inclusion of a community-based learning environment in business-related programs can enhance students' confidence in knowledge application and their ability to connect with the business world. Students are exposed to a broad variety of fresh viewpoints and experiences through their capstone project that are not covered in class. It is imperative to arm oneself with the information and abilities needed to make oneself a desirable candidate for recruiters. Capstone projects are a way for academic institutions to help students get ready for the workforce. Students would be required to solve actual business challenges while also honing their soft skills. The competencies and credentials acquired via a capstone project can greatly augment a student's preparedness for the labor market or for additional academic endeavors, making them more competitive in their selected domain. However, it should be noted that the particular advantages will vary based on the project's type and the student's level of dedication and work. Nevertheless, students, lecturers, institutions, and communities would all benefit from this kind of education since it would instill a sense of civic responsibility and citizenship traits like cooperation, leadership, tolerance for cultural differences, interpersonal skills, and the capacity to start change in the community.

Prior to engaging in capstone projects, a needs analysis with the community is required to guarantee that the capabilities of the students and business needs are matched. In order to optimize capstone project outcomes, higher education institutions need to strategically assign a single center to lead community networking initiatives. It would be feasible to optimize the

advantages of both "worlds" with students able to satisfy learning objectives and cultivate their own convictions and skill sets in addition to serving the real demands of the business sectors. Higher education institutions also need to be aware of potential problems that could occur when managing capstone projects, like conflicts and time management. These challenges highlight the importance of careful planning, resource allocation, and support for both students and lecturers in order to effectively implement the capstone course. Finally, this study has presented the students' perceptions of the benefits of a capstone course and the challenges they faced. Further studies, however, are needed to capture other stakeholders' views, especially the business stakeholder in the capstone courses.

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E-Module in TVET: Unveiling Brazing and Riveting Methods Through VAK Learning

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Abstract
The electronic module (e-module) concern within the realm of Technical and Vocational Education and Training (TVET) pertains to the obstacles related to the incorporation and proficient utilization of electronic learning resources in vocational education systems. The issues discussed involve several factors, including insufficient digital infrastructure, restricted technological accessibility, differing degrees of digital literacy among educators and learners, and the necessity for comprehensive training and assistance to facilitate the smooth integration of e-module. This research focuses on the creation of an educational e-module for vocational colleges, specifically targeting the refrigeration and air conditioning program. The instructional material is designed to cater various learning styles, including visual, auditory, and kinesthetic (VAK) approaches. The purpose of this e-module is to facilitate the acquisition of knowledge for both teachers and students through the utilization of high-quality reference materials for the Fabrication of Piping, Tubing, and Metal topics. The researcher employed a semi-structured interview as the research instrument to evaluate the usability of the learning e-module in this study. Subsequently, the interview data will undergo thematic analysis and subsequently be assessed using Cohen's Kappa statistic, which will ascertain the level of agreement over the usefulness of the e-learning module. The findings of this study indicate that the e-module created possesses attributes of interest and suitability, rendering it a viable resource for reference purposes. The development of this learning e-module is anticipated to yield benefits for both instructors and students in the teaching and learning process.

Keywords: Educational Module, E-Module, Technical and Vocational Education and Training (TVET), VAK Model

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Introduction

The education system in Malaysia is experiencing changes in line with advancements in Information and Communication Technology (ICT) as it follows the trajectory of modernity (Lapammu & Mahamod, 2018). The advancement in the domain of ICT has the potential to bring about significant transformations in contemporary education, particularly in the teaching and learning practices of the present age. The current era of technological progress has led to a significant increase in the need for proficient and highly skilled labor across several industrial domains. Furthermore, the establishment of collaborations between TVET institutions and industry entities can encompass several aspects such as the provision of training facilities, practical on-the-job training, and internship opportunities. These collaborative efforts serve to enhance trainees' comprehension of industry requirements and equip them with the necessary skills to effectively tackle real-world employment demands (Ramamuruthy, Alias & DeWitt, 2021). Hence, the interconnectedness of TVET, e-modules and the industry serve to narrow the divide between formal education and the practical realm of employment, so enhancing the calibre and applicability of the workforce generated.

The e-module concern within the realm of TVET pertains to the obstacles related to the incorporation and proficient utilization of electronic learning resources in vocational education systems. The issues discussed involve several factors, including insufficient digital infrastructure, restricted technological accessibility, differing degrees of digital literacy among educators and learners and the necessity for comprehensive training and assistance to facilitate the smooth integration of e-modules (Johar & Abdullah, 2019). To effectively tackle this matter, it is imperative to adopt a holistic approach encompassing various measures such as allocating resources towards digital infrastructure, implementing comprehensive training initiatives for educators, and creating a supportive ecosystem that facilitates the seamless integration of e-modules (Abi Hamid, Yuliawati & Aribowo, 2020). These efforts will ultimately contribute to the improvement of both the caliber and availability of TVET programs.

This research focuses on the development of an educational e-module for vocational colleges, specifically targeting the refrigeration and air conditioning program by applying ADDIE Model. The instructional material is designed to cater various learning styles, including visual, auditory, and kinesthetic (VAK) approaches. The purpose of this e-module is to facilitate the acquisition of knowledge for both teachers and students through the utilization of high-quality reference materials for the Fabrication of Piping, Tubing, and Metal topics. Later, the developed e-module will be tested to understand the result of its' usability.

Upon these introductions, this paper is organized on the following sections: literature review, methodology (by of the application of ADDIE Model), results and discussions, and conclusion. The later part will contain acknowledgement and the list of references.

Literature Review

The transformation of vocational education represents a concerted endeavor to enhance the capacity and effectiveness of the vocational education system. According to Noridah (2020), it has the potential to facilitate the transition of the nation into a high-income country. The primary objective of technical and vocational education is to cultivate a cohort of individuals who has extensive expertise and proficiency in specific domains (Krismadinata et al., 2020). Hence, it is imperative that the instructional methods employed in vocational education be

engaging and have the ability to captivate students, thereby encouraging their enrolment in the various disciplines offered by institutions like Vocational Colleges, in alignment with the evolving era of information and communication technology.

According to Aziz & Sieng (2019), e-learning is considered an innovative approach inside the reformed education system, with the intention of supplanting the current educational framework. The utilization of ICT as a facilitator in the process of pedagogy and the promotion of self-directed learning is a prominent educational approach. This strategy proves to be highly effective, particularly with the implementation of computer-based learning modules, such as teaching aids. To optimize the efficacy of the teaching and learning process, it is imperative to incorporate teaching aids as a technological tool and learning resource to ensure a robust educational experience. The utilization of teaching aids has the potential to enhance the learning experience by captivating students' attention and facilitating a deeper comprehension of the instructional material (Bakhir, et al., 2016).

Hence, the utilization of teaching aids is strongly advocated for the purpose of online education. According to Siregar, Suhardi & Munandar (2022), teaching aids encompasses various categories, one of which pertains to non-electronic teaching aids that continue to be utilized in a manual manner. Subsequently, electronic teaching aids refer to instructional tools that employ electronic devices to elucidate educational slides to students. Consequently, the use of Adaptive Blended Learning Models has the potential to facilitate students' comprehension of course content. In contemporary times, educators persist in utilizing textbooks as the primary means of accessing reference materials (Alalwan et al., 2020). This finding indicates a higher prevalence of teachers employing traditional instructional approaches compared to e-learning methodologies. The utilization of the teaching aids through e-learning application approach has garnered significant attention and recognition. This phenomenon can be attributed to the widespread availability of online resources, which can be accessed conveniently from any location, as opposed to the traditional method of in-person learning (Saito & Tangkiengsirisin, 2023).

Alternative approaches such as the one mentioned are highly beneficial within the context of the Professional Development Program (Leary et al., 2020). Moreover, instructors have demonstrated a commendable commitment to staying abreast of contemporary advancements in technology. Nevertheless, there exist certain limitations, such as the prerequisite for instructors or students to maintain uninterrupted internet connectivity in order to avail themselves of reference materials. Enhancements to e-modules have the potential to enhance and foster pupils' cognitive abilities. Teaching aids strategies, such as the utilization of e-modules incorporating videos and pictures, are recommended to be emphasized due to their potential to enhance student comprehension.

Every student possesses an individualized learning style that facilitates their comprehension of the instructional material presented by the teacher. The learning style of a student is a significant determinant in enhancing the caliber of their learning experience. The incorporation of visual, auditory, and kinesthetic learning methods, sometimes referred to as VAK, is crucial in the educational process (Purwasih et al., 2022). Given this circumstance, the significance of learning style in the educational process cannot be overstated, as it enables educators to design instructional experiences and serve as a compass for tailoring teaching methods to suit individual students (Mahadi, Husin & Hassan, 2022). In order to accommodate the diverse learning styles of pupils, it is imperative for instructors to furnish a

range of learning tools. This facilitates an equitable learning experience for all students, enabling them to maximize their learning potential and get equal educational resources.

According to Rahman et al. (2015), vocational students often experience a sense of boredom during the instructional and learning procedures, leading to a lack of enthusiasm in acquiring comprehensive knowledge of learning theory. The impact of this issue has had a detrimental effect on students' knowledge and abilities, resulting in low theoretical scores in the context of teaching and learning in technical and vocational. This is particularly evident in disciplines that prioritize practical aspects over theoretical ones, leading to a lack of in-depth knowledge development among students (Mansurjonovich & Davronovich, 2023). The e-module that has been designed utilizes the VAK learning method, as it aligns well with the subject matter of Joining Metal by Brazing and Riveting. These particular topics necessitate students to engage in hands-on activities and possess a solid understanding of the subject matter in order to effectively carry out practical work.

The absence of well-defined modules and limited availability of reference materials provide challenges for students engaging in self-directed study. Vocational students encounter time limitations in their learning process and are often confronted with a shortage of appropriate resources and equipment (Akhmedov, 2019). Given the aforementioned circumstances, it becomes apparent that there exists a necessity to modify the pedagogical approach by including interactive learning tools, such as teaching aids, specifically e-modules. This implementation has the potential to enhance students' comprehension and engagement, particularly within the realm of technical subjects. Consequently, the implementation of this e-module will facilitate students' acquisition of knowledge pertaining to the subject matter at hand (Fahrurrozi et al., 2023).

Given the moderate level of student proficiency in the selected course and the absence of specific modules pertaining to this subject, the researcher has devised an e-module for the subjects of Joining Metal through Brazing and Riveting. This module is intended for students enrolled in the Refrigeration and Air Conditioning Technology program at the Vocational College. It serves as a high-quality, engaging, and adaptable medium for learning, as well as a valuable source of reference. Hence, it is anticipated that the creation of this e-module will enhance students' comprehension, abilities, and accomplishments, while also fostering a beneficial influence on the educational system, resulting in the production of well-rounded and competitive graduates.

Thus, this study aims to create an educational e-module that focuses on the subject of Join Metal by Brazing and Riveting. The e-module is designed to cater primarily to students enrolled in the Refrigeration and Air Conditioning Technology program. The objective is to enhance students' proficiency in the subject matter and enhance their capacity to use the acquired information within the industry. In general, the incorporation of contemporary pedagogical approaches, namely through electronic learning, serves to augment the educational system and provide students with the necessary skills to meet the requirements of the ever-changing labor market. The emphasis placed on vocational education and the acquisition of specialized technical skills is in accordance with the demands of the nation's industrial sectors.
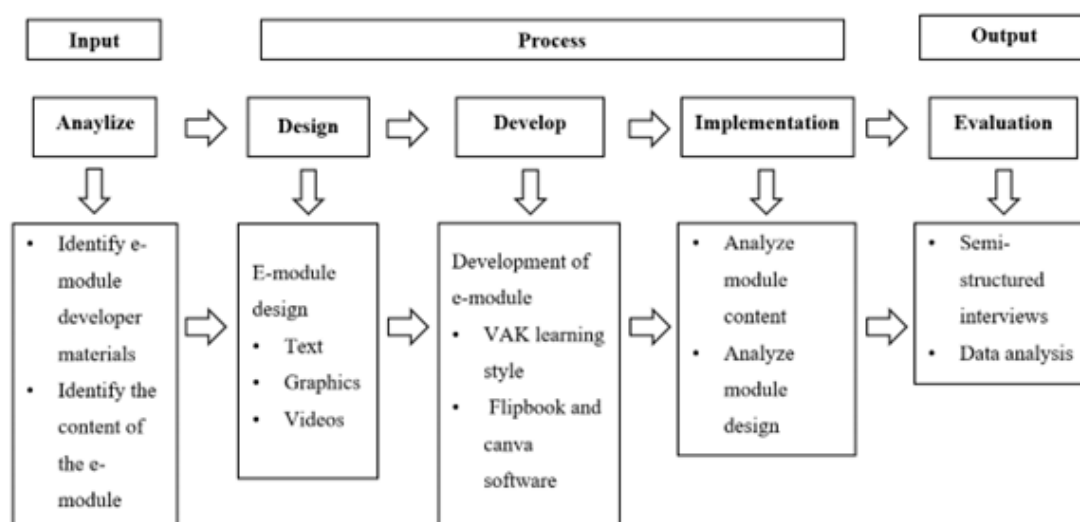
Figure 1: Research Procedure for the Development of Join Metal by
Brazing and Riveting E-Module

The VAK learning style encompasses three fundamental components, namely auditory, visual, and kinaesthetic modalities. This particular learning style encompasses three distinct modalities via which pupils acquire knowledge: visual, auditory, and kinaesthetic. A visual learner is an individual who demonstrates a preference for acquiring knowledge via the utilization of illustrations or pictures. Conversely, an auditory learner is one who exhibits a propensity for learning by actively listening to explanations or engaging in conversations with others. Lastly, a kinaesthetic learner is characterized by a preference for practical, hands-on learning experiences (Bakri, Rahman & Jabu, 2019). The primary focus of this e-module will be on the Joining Metal by Brazing and Riveting topic, which are integral components of the refrigeration and air conditioning technology program. The e-module was created as an educational resource for first-year students enrolled in the refrigeration and air conditioning technology program at the Vocational College. The objective of the e-module is to enhance students' proficiency in the subject matter and enhance their capacity to effectively use the acquired information within the industry. The emphasis placed on vocational education and the acquisition of specific technical skills is in accordance with the demands of the nation's industrial sectors.

Hence, the implementation of this e-module will facilitate students in acquiring knowledge pertaining to the relevant subjects. Given the moderate level of student proficiency in the selected course and the absence of specific modules pertaining to this subject, the researcher has devised a learning electronic module focusing on the concepts of joining metal through brazing and riveting. This module is intended for students enrolled in the Refrigeration and Air Conditioning Technology program at the Vocational College. It serves as a high-quality, engaging and adaptable learning tool, as well as a valuable source of reference material. Hence, the researcher anticipates that the creation of this e-module will enhance students' comprehension, abilities, and accomplishments, while also positively influencing the education system to cultivate well-rounded and competitive graduates.

Methodology

This study employs the Design Development Research (DDR) framework, with a specific focus on utilizing the ADDIE model. The DDR is a method employed for the purpose of

constructing targeted goods. In the context of this study, the ADDIE model (Analysis, Design, Development, Implementation and Evaluation) has been selected as the framework for product creation. The process of data collection entails employing a quantitative data, which enables the researcher to acquire information from participants. The research will encompass a minimum of three participants who were educators (users of the product) in order to assess the usability of the e-module that has been developed. The study employs a combination of quantitative methodologies. The collection of data was conducted through interviews in order to evaluate the usability of the e-module, whereas quantitative approaches are employed to analyze the data derived from these interviews. The ADDIE model is chosen due to its compatibility with the development design of the e-module and its provision of an organized and systematic approach encompassing five distinct phases, namely analysis, design, development, implementation and evaluation (Molenda, 2003). The model is renowned for its ability to generate high-quality e-module. The appropriateness of the ADDIE model and the incorporation of quantitative approaches are crucial in attaining the study objectives and generating an authentic and dependable e-module for the Fabrication of Piping, Tubing and Metal course.

i. Analysis

The analysis step holds significant importance in the development of suitable instructional materials. In order to gather pertinent data for the study, the researcher implemented a series of procedures aimed at identifying the challenges encountered by students and teachers. To this end, a preliminary survey was done, employing a method including the search and analysis of the identified issues. The researcher has undertaken a survey by reviewing existing studies via an online search. The researcher systematically examines and evaluates all relevant data and information acquired from diverse sources, afterwards organizing and interpreting it in accordance with the conducted research. Furthermore, the researcher conducted an analysis of the suitable developmental resources employed for the creation of the electronic module, as well as the information encompassed inside such module. In order to ascertain the content of the e-module and identify suitable development materials for this instructional e-module, the researcher conducted a comprehensive analysis of the available information from diverse sources. Subsequently, the data was processed in accordance with the relevance to the ongoing study.

The objective of this study is to ascertain the primary challenges encountered by educators and learners during the instructional and educational process. Furthermore, the objective is to ascertain appropriate e-module development materials and information for incorporation into e-modules, and afterwards generate instructor and student-friendly e-modules as potential solutions. Hence, the researcher's investigation revealed that there is currently no precise learning e-module available for the Fabrication of Piping, Tubing, and Metal course. Furthermore, the study also identified the specific development materials employed for the creation of e-module, namely the flipbook and Canva software. Furthermore, the researcher has determined that the content to be created for this electronic module is grounded on the learning style known as VAK.
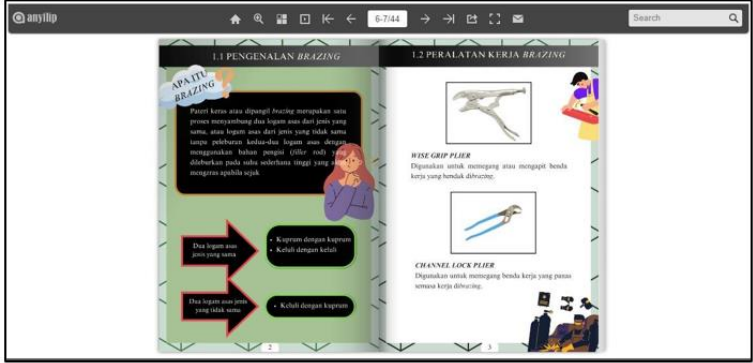
ii. Design

During this stage, the researcher integrates the gathered information, data and concepts from the analysis phase in order to develop a high-quality and engaging electronic module for learning purposes. In order to create an effective e-module, it is necessary to ensure that the

design incorporates text, graphics, and video elements that align with the VAK learning style. This learning strategy serves as the foundation for the development of the e-module. Subsequently, the researcher proceeded to formulate the e-module design by utilizing the storyboarding technique and employing Canva software, as informed by the analysis conducted.

The design of e-module encompasses several elements, including textual content, graphics and video components, which will be presented in a structured manner resembling a storyboard. The purpose of this endeavor is to provide a comprehensive understanding to the researcher in the creation of this electronic module, while also streamlining the development procedure of this educational electronic module. Storyboards serve as a form of documentation utilized in the production of interactive multimedia. The document has programming instructions, audio scripts, and comprehensive depictions of visual components, including text, video, graphics, and animation. Consequently, the researcher formulated a development plan grounded in the conducted analysis and employed suitable methodologies to generate an electronic module capable of attaining the aims and addressing the study inquiries.

The VAK learning style paradigm comprises three fundamental components, namely visual, auditory, and kinesthetic. Based on this particular learning style, it is posited that students acquire knowledge and skills through three distinct modes of learning. In educational settings, it is observed that students often employ visual aids such as illustrations or pictures to enhance their understanding and communication of concepts. Auditory learners, characterized by their preference for acquiring knowledge through auditory stimuli such as listening to explanations or engaging in dialogues, as well as kinesthetic learners, who have a propensity for practical learning, are two distinct types of pupils. The implementation details of each element are depicted in Figure 2.

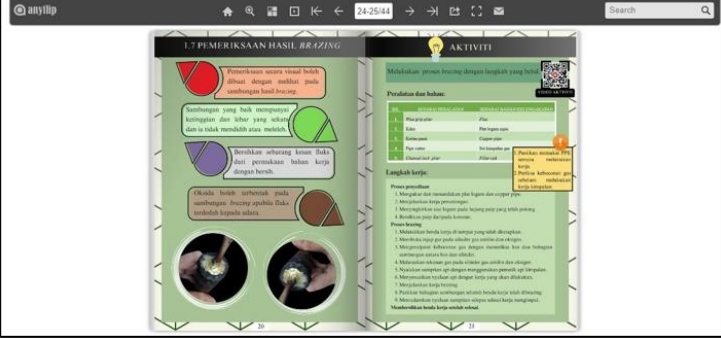| No.	Design	Display and Description
1.	Visual Elements	 Visual learners prefer visual learning tools. Visual learners enjoy visual learning. This class learns fast. Students can visually display and preserve information. This e-module offers visuals and intriguing writing to illustrate each explanation. Visual learners understand better. They like painting, sketching, manipulating images, building, and assembling. They can read, write, solve puzzles, and comprehend charts and graphs.

2.	Auditory Elements	
		Listening helps us comprehend what others say. Storytelling, education, comedy, and remembering can help these students. Thus, this e-module has an activity video for each topic. Students can read or listen to this video. The e-module has been designed based on the VAK learning method, which incorporates visual and aural components included in the produced activity videos. Given the circumstances, it is evident that this electronic module aligns with the preferred learning style of the intended audience.
3.	Kinesthetics' Elements	
		The e-module has been designed based on the VAK learning style, incorporating a range of activities and instructions for students to engage with following the acquisition of theoretical knowledge. Students that possess a kinesthetics learning style typically demonstrate a proclivity for acquiring knowledge through experiential or practical means. Given the aforementioned circumstances, it is evident that this electronic module aligns with the kinesthetics learning style, since the researcher incorporates many activities for students to engage in.

Figure 2: Design Criteria Development

iii. Development

Once the e-module completes the design phase, the subsequent phase of development must be executed in accordance with the plans set during the design phase. The utilization of the specified elements and media technologies from the analysis and design phase will be employed by the researcher to develop a high-quality e-module for learning purposes. This e-module will be grounded in the theory of visual, aural, and kinesthetic learning styles. The production phase of this e-module encompasses several aspects, including text, pictures, video, and audio, which have the potential to captivate students' attention.

The e-module was developed by the researcher through the utilization of various software tools. Canva was employed for incorporating text elements and graphics into the e-module, while Capcut software was utilized to create video activities based on the pre-determined storyboard. This approach was adopted in order to align with the VAK learning style and facilitate the development of the e-module. Furthermore, the production of a video entails a series of steps, including the capturing and editing of the footage, as well as the development of an appropriate script to be incorporated into this educational e-module. Upon completion of the development of the e-module, it will be integrated into the flipbook software, hence enabling seamless utilization of the e-module.

iv. Implementation

After the development of the e-module, the researcher will proceed to implement it in authentic settings and evaluate the usefulness of the learning e-module. The e-module will undergo an evaluation procedure, wherein three respondents will be interviewed to identify and address the shortcomings identified during the development phase. This method aims to improve the e-module. Subsequently, the researcher solicited input from the participants pertaining to the design and usability of the electronic module in effectively attaining the study's objectives, employing interviews as the chosen method of data collection. The researcher is required to gather input from respondents in order to conduct an evaluation of the generated e-module.

v. Evaluation

The researcher conducts an evaluation process to determine whether the usability of the generated e-module aligns with the objectives of the study, or conversely. The evaluation step involves the analysis of data collected from interviews in order to obtain insights into the development of the e-module, its ability to address the identified challenges, and its relevance to the study topics. If necessary, enhancements will be implemented prior to proceeding to the subsequent phase in order to effectively address any problems or issues that may develop. During the concluding phase, the data is subjected to analysis through interviews performed to assess the usefulness of the developed e-module, as well as to establish the extent to which the study's objectives have been met (Gholami & Bagheri, 2013).

The researcher utilized a product design in this study, employing semi-structured interview evaluations as research instruments to gather feedback from participants regarding the usability of the product. Subsequently, the collected data was quantified to determine the coefficient of agreement using the Cohen Kappa Index. The primary objective of the instrument supplied is to evaluate the degree of usability exhibited by the product. The semi-structured interview been done with three instructors specializing in refrigeration and air conditioning. The study involved a single interview session with participants, focusing on their perceptions of the functional capabilities of the e-module, as the research instrument separation in Table 1.

Section	Construct	No. of Questions
Item A	Respondent information	4
Item B	Content Quality	2
Item C	Potential usability	3
Item D	Overall satisfaction	1
Item E	Suggestion and improvement	1

Table 1: The Division of Items in Semi-Structured Interview

Two questionnaire experts will assess the semi-structured interview questions before questioning individuals. These questions are categorized intentionally. Open and closed questions require basic answers. The code will choose the conclusion from each question's topic. Finding this code yields frequency numbers. Semi-structured dialogues will determine product usefulness. Item A, B, C, D and E were the discussion questions for this study. Item A asks about the respondent's background and other pertinent information. Item B covers product benefits and use. Potential usability is on item C and overall satisfaction as item D. Then, item E seeks product suggestion and improvement.

Robinson (2014) suggests picking research subjects based on their willingness to participate. The participants in this study comprise teaching staff members who are responsible for instructing students enrolled in the Refrigeration and Air Conditioning Technology program at Vocational Colleges. The participants for this study were chosen based on shared characteristics in their utilization of the produced e-module. The participants of this study were selected from a Vocational College, namely three instructors specializing in refrigeration and air conditioning. These instructors were chosen to utilize the newly built teaching and learning e-module.

Thematic analysis can encompass multiple perspectives and is beneficial for novice researchers, according to Braun & Clarke (2006). Thematic analysis uses recorded interview data to identify themes. The system's main, unaltered data will come from selected users. The researcher recorded, collected, analyzed, and interpreted the interview data for this study. The researcher analyzes interview transcripts to evaluate terms, identify key data, and organize it. Data was coded using predetermined criteria. The analysis excluded irrelevant data. The Cohen Kappa index acceptance evaluation scale ensured that semi-structured interview answers were analyzed into appropriate themes and codes. This simplified product usability evaluation. Quantitative data from four semi-structured interviews was converted into tables and descriptions. These tables and explanations showed objects, percentages, and frequency.

Results and Discussions

Thematic analysis was employed to identify several aspects that could be inferred from the transcript of the interview. Each participant underwent an interview in which they were queried about their personal information, encompassing their name, age, place of origin, and educational attainment. The objective of this investigation is to enhance the researcher's comprehension of the individuals who were questioned. The responses made by each participant, based on the quality of their substance, are exemplified in the following interview question:

> 'In my view, the developed module does achieve the objective developed by the researcher.' (Sample 1)

'In my opinion the module developed by this student achieves the objective which can complete the teaching session at the vocational college.' (Sample 2)

'The module developed by this student can complete the teaching session at the vocational college because this module is very helpful for the teaching staff.' (Sample 2)

The coding process will be conducted by the researcher, who will determine the necessary coding criteria depending on the specific objectives of the study. The researcher generated a maximum number of codes in accordance with the recommendations of Braun and Clarke (2006). Consequently, the researcher derived a total of 30 codes from the data obtained through interviews. In the initial step, definitions are established for each code, followed by a subsequent stage where all codes undergo refinement. Table 2 presents the initial codes generated:

No.	Initial Code	No.	Initial Code
1	Achieve the objective	16	Interest
2	Complete the teaching session	17	Has a lot of information
3	Helping the teaching staff	18	Improve understanding
4	Easy to understand	19	Provide QR code
5	Total touching	20	Providing videos is very appropriate
6	Covers the entire content	21	Meet the characteristics that are appropriate for learning
7	Very organized	22	Includes Visual, Auditory, Kinesthetics teaching models
8	Very appropriate	23	Content that is relevant
9	Concise	24	Very appropriate
10	This module is interesting	25	Video preparation
11	Not boring.	26	Apply various teaching techniques
12	Not confusing.	27	Satisfied
13	Graphically shaped	28	Very effective
14	The best module	29	The usability of the module is very good
15	Infographic form	30	Neat writing

Table 2: Initial Coding of Interview Data

The process of re-examining themes was conducted using a two-tiered review approach, wherein sub-themes were carefully scrutinized and codes were derived from the interview data. During the initial phase, an evaluation was conducted to determine the extent of the interrelation between each code inside the sub-theme. The code will be excluded if it lacks compatibility with the sub theme. Consequently, at this juncture, several codes are excluded and consolidated into a singular code within a unified subtheme. The initial code generated during the coding process is decreased by two codes, resulting in a reduction from 30 codes to 28 codes. Table 3 presents the codes organized according to sub-themes:

No.	Sub Themes Developed	Number Code Arranged in Theme
1	The objective of the e-module	3
2	The content of the e-module	10
3	Presentation of e-module	8
4	E-module evaluation	6
5	E-module satisfaction	1
	Total	**28**

Table 3: Number of In-Sub Themes

The themes and features identified from the interviews will be validated by the researcher through the utilization of the Cohen Kappa method. This approach entails evaluating the level of agreement between two assessors or coders when assigning ratings to categorical variables. Interrater reliability pertains to the extent of concordance among two or more observers or raters in giving identical ratings or categories to an observation or textual piece. This finding underscores the importance of raters sharing a common perspective and engaging in comparable research practices in order to enhance the trustworthiness of results.

The presence of high reliability in a study suggests that efforts have been made to eliminate individual bias, hence increasing the likelihood that other researchers, employing the same categories, will arrive at similar conclusions when analyzing the data. This inquiry examines the concept of qualitative validity and the strategies employed to ascertain the precision and dependability of interview data. The incorporation of the Cohen Kappa technique and the notion of interrater reliability contributes to the scholarly nature of the research study, augmenting the robustness of the findings and the validity of the conclusions derived from the collected data. The Cohen's Kappa calculation procedure was utilized to determine the level of agreement between the two assessors in analyzing the interview data. The results indicate a substantial agreement value of 88%. A specific illustration of the Cohen's Kappa computation is provided in Table 4.

Type of data	Researcher	Interrater 1	Interrater 2	Coefficient of agreement	Cohen Kappa
Interview	$= \dfrac{28 - 14}{28 - 14}$	$= \dfrac{26 - 14}{28 - 14}$	$= \dfrac{25 - 14}{28 - 14}$	$\dfrac{1.0 + 0.86 + 0.78}{3}$	0.88
	$K = 1.00$	$K = 0.86$	$K = 0.78$	$= 0.88$	

Table 4: Calculation of Cohens Kappa

The Cohen Kappa agreement scale, as proposed by Cohen (1960) and further supported by Ghazali, Johare & Masrek (2011), is presented in table 5. In this scale, agreement values of 81% and 100% are considered high and indicative of very good agreement. Agreement values ranging from 61% to 80% are classified as good, while values between 41% and 60% are considered moderate. Agreement values falling within the range of 21% to 40% are categorized as weak, and values ranging from 0% to 20% are considered very weak. The proportion of scores achieved for the collected interview data is 88%. Hence, it can be inferred that the degree of consensus on the utility of the Join Metal by Brazing and Riveting e-module topic in Fabrication of Piping, Tubing and Metal course is quite favorable.

Score	Interpretation
0.81-1.00	Very good
0.61-0.80	Good
0.41-0.60	Moderate
0.21-0.40	Weak
0-0.20	Very weak

Table 5: Kappa Coefficient Value

The e-module for the subjects of Join Metal by Brazing and Riveting in the context of Refrigeration and Air Conditioning Technology, catered towards students enrolled in Vocational Colleges, has been developed with consideration for the VAK learning style. This module integrates various sensory modalities, including visual, auditory, and kinesthetic elements, to offer a comprehensive learning experience tailored to individual students' preferences. Visual components, such as images and video demonstrations, are incorporated, along with auditory elements like audio recordings and expert interviews. The VAK learning style hypothesis classifies persons into three categories: visual, auditory, or kinesthetic learners. This theory proposes that individuals possess preferences for obtaining information through visual stimuli, aural cues, or hands-on experiences (Litta & Budiarty, 2020).

Additionally, kinesthetic aspects were addressed through interactive simulations, practical activities, and project assignments that involve hands-on practice of brazing and riveting techniques. The objective is to provide a well-rounded educational encounter that accommodates diverse learning styles. VAK learning style approach encompasses several key steps, including an initial needs analysis, the development of content utilizing visual elements such as pictures and videos, the integration of auditory components such as audio narration and interviews, and the inclusion of kinesthetic elements such as interactive simulations and practical activities. Additionally, the e-module will feature assessments and project tasks to further enhance the learning experience. The technique emphasizes the integration of these aspects in order to facilitate complete and interactive learning, taking into consideration the individual student's preferred learning styles (Guo et al., 2020).

The assessment of the usability of the e-module is a crucial component of this research. The usability of the constructed learning e-module was assessed by the researcher in order to determine its effectiveness for vocational college students specializing in refrigeration and air conditioning. The objective was to evaluate the extent to which these students may benefit from utilizing the e-module as a learning tool. The evaluation of the necessity and significance of creating instructional aids and building teaching modules is conducted based on the usability and comprehensibility of the module by stakeholders engaged in teaching and learning activities (Nashir, Zainal, & Sulaiman, 2022). The e-module is distributed to vocational college instructors specializing in teaching courses on Fabrication of Piping, Tubing, and Metal. Its purpose is to gather comments and suggestions for enhancing the generated e-module through the utilization of the interview approach. According to Kamal, Jajuli, and Nafiah (2023), there is a need for enhancements in the delivery of content in order to increase its level of engagement.

This study primarily examines the usability of the e-module, with a particular emphasis on the agreement among respondents. The findings indicate a high degree of usefulness for the e-module. The researcher selected three participants who are educators specializing in the subjects covered by the e-module. These individuals were chosen to provide insights into the

development of the e-module through the means of interviews. Following the conclusion of the interview session, the researcher employed the thematic analysis method to extract significant information from the interview transcripts generated by the researcher. Through the application of thematic analysis, the investigator identified a number of sub-themes that facilitated the exploration of the third research inquiry (Byrne, 2022). Based on the sub-themes identified, the researcher can derive insights on the usability of the e-module in relation to its content, presentation, evaluation, as well as the level of user satisfaction with the generated e-module, along with recommendations for enhancing its effectiveness.

All participants provided affirmative responses and reached a consensus that the produced electronic module is characterized by user-friendliness and usability. Numerous research has indicated that the utilization of multimedia can provide beneficial outcomes in the context of pedagogy and professional development. According to Al Hashimi et al., (2019), the strategic utilization of media can enhance the pace and efficacy of learning, hence facilitating the successful attainment of learning goals. Furthermore, the analysis conducted on the usability component of this e-module unequivocally demonstrates its exceptional usability and its effective contribution towards assisting teachers in the teaching and learning process for the Fabrication of Piping, Tubing, and Metal course. The findings of Rashid & Bakar (2023) indicate that the utilization of teaching aids has resulted in a favorable perception among the participants, suggesting that its implementation has the potential to enhance the engagement and appeal of teaching and learning endeavors. The consideration of usability is crucial in maintaining the ongoing efficacy and pertinence of this electronic module designed for educators in Vocational Colleges.

Conclusion

Based on the preceding discourse, it can be inferred that the e-module produced by the researcher has effectively tackled the research inquiries posited as the research objective. The individual who participated in the study as a respondent is an instructor who specializes in the subject matter being taught. They show a willingness to collaborate and offered insightful comments to the researcher. The e-module was subjected to an evaluation by the researcher, which yielded a positive overall assessment. The feedback received highlighted the e-module's usability, encompassing several factors such as its format, content, visuals and design. The utilization of the ADDIE model proved advantageous for the researcher during the developmental phase of this instructional e-module, which serves as a comprehensive guide and reference, enhancing its efficacy as a significant educational resource in the teaching and learning process. The data indicates a significant level of consensus among respondents, suggesting that the usability of this e-module effectively supports teaching and learning in the Refrigeration and Air Conditioning program for both teachers and students. In conclusion, the results of the analysis and assessment undertaken indicate that the constructed educational electronic module effectively achieves its intended goals and has garnered favorable responses from the participants.

Acknowledgment

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An Assessment of Students' Mathematical Competency Through the Mathematics Festival's Activity

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Abstract

The purpose of this research was to explore ways in assessing students' mathematical competencies needed for the 21st-century goal. The creation of the Thailand Mathematics Festival was adapted from the original Moscow Mathematics Festival in providing various assessment activities to analyze students' mathematical competencies. The target group consisted of seventh-grade students who participated in the second Thailand Mathematics Festival 2020. The research instrument was the Olympiad activity as a part of the Mathematics Festival. This was used to collect their mathematical thinking/ideas related to mathematics contents defined by experts from the Moscow Center for Continuous Mathematical Education (MCCME, 2021) that will lead to the performance of the students' mathematical competence. Data were collected based on students' expressive ideas according to their problem-solving solutions, indicated in their worksheets. The data were analyzed by using the mathematical thinking framework of Isoda & Katagiri (2012). The findings indicated that the Mathematics Olympiad functions as a tool for assessing the mathematical competencies of seventh-grade students. The findings imply that students have the ability to exhibit their mathematical competencies through their mathematical thinking in terms of the following Mathematical idea: Idea of Sets; Units; Representation; Operation; Algorithms; Approximations; Fundamental Properties; Functional Thinking, and Idea of Expressions.

Keywords: Assessment, Mathematical Competency, Mathematics Festival

Introduction

In the 21st century, global transformations necessitate nations to prioritize workforce development and higher-order skills (Wandee et al., 2018). Educational systems must adapt to prepare individuals for rapid changes, emphasizing 21st-century skills crucial for addressing modern challenges (Jintana, 2015). Rizki and Priatna (2019) underscore the importance of mathematical literacy, aligning with competencies like critical thinking and collaboration (Berry, 2018). Effective mathematics education should shift from memorization to connected learning experiences (Lampert, 2001; NCTM, 2010). Classroom discourse activities promoting reasoning, interpretation, and collaboration are essential for students to apply mathematical concepts (Smit, 2016).

Responding to 21st-century demands, Southeast Asian countries, particularly Thailand, face a shortage of skilled labor in mathematics-related fields. Assessments like TIMSS and PISA reveal low mathematical competency among Thai students (Inprasitha, 2017). An education system aligned with 21st-century goals, focusing on practical application skills over standardized testing, is essential (Bellanca & Brandt, 2011). Thailand's participation in the Mathematical Festival showcases collaborative efforts to enhance math learning in a joyful context (Inprasitha, 2019).

The Moscow Mathematical Olympiad, held for 75 years, challenges students with diverse, difficult problems to stimulate creativity (Fedorov et al., 2011). The competition's "non-standard tasks" emphasize imagination and flexibility (Yashchenko, 2013). Mathematical Olympiads assess problem-solving abilities, focusing on clear and understandable mathematical concepts (IMO Foundation, 2015). The Olympiad incorporates "Mathematical Festival" activities, aligning with Moscow's efforts to promote cultural and mathematical understanding since 2009 (Moscow Center for Continuous Mathematical Education, 2022).

The Mathematical Festival, emphasizing mathematical thinking and joyful engagement, crucial for independent problem-solving in a changing world. The festival involves problem-solving and games, providing a positive avenue for students to experience the beauty of mathematics. This aligns with the modern educational shift towards cultivating Mathematical Thinking, particularly in connection with mathematical content, operation, algorithms, and expressions. The festival's non-standard tasks challenge students' imagination and problem-solving skills, addressing the global need for adaptable skills. Assessing students' mathematical competency during the festival reflects a departure from traditional standardized testing, emphasizing practical application skills (Bellanca & Brandt, 2011). The study aims to analyze the mathematical competency demonstrated by Thai high school students during the Mathematical Festival, using Isoda and Katagiri's framework (2012).

Methodology

The study focused on 124 seventh-grade students from 14 schools who actively participated in the second Thailand Mathematics Festival held in 2020. The research instrument chosen for this study was the Mathematics Olympiad, a key component of the festival. The selection of this instrument was grounded in its ability to elicit comprehensive responses from students, showcasing their mathematical thinking and problem-solving skills.

The mathematical contents targeted in the Olympiad were carefully curated by experts from the Moscow Center for Continuous Mathematical Education (MCCME, 2021). These

contents covered a wide spectrum of competencies, including geometric facts, decimal notation, constructive problem-solving, combinatorics, textual problem analysis, and logical reasoning. This alignment with expert-defined contents aimed to ensure that the assessment was not only meaningful but also reflective of globally acknowledged mathematical competencies.

Instruments

In this research, the researcher employed the Mathematical Festival as the primary instrument for data collection. The event, held for the second time in Thailand on December 19, 2020, at Moscow State University, Russia, has been a continuous tradition for over 30 years (since 1990). The target participants included students from 6th-grade to 1st-year high school, displaying an interest in mathematics-related fields. The festival comprised Olympiad activities, lectures for students and parents, mathematical games, mathematical cartoons, and various other activities as per the schedule.

Figure 1: Mathematical Festival Schedule (December 19, 2020)

Mathematical Olympiad Activities

This comprehensive methodology ensured the quality and appropriateness of the Mathematical Festival instrument for assessing mathematical competency among Thai high school students, as shown in Figure 1.
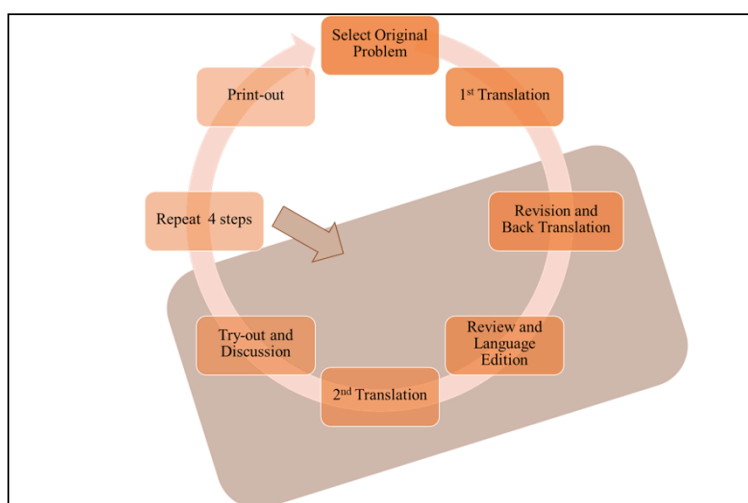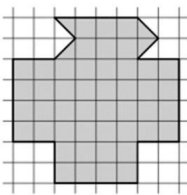
Figure 2: The Development Process of Mathematical Olympiad Problems.

1) Problem Set Development: A team of experts from Moscow Center for Continuous Mathematical Education (MCCME) selected 40 original problems used in Moscow Mathematical Olympiads.

2) Translation Process: Thai and Russian language experts translated the problem sets back and forth to ensure linguistic accuracy.

3) Thai Language Review: Experts in Thai language and mathematics from Thailand reviewed and selected 7 problems suitable for 1st-year high school students.

4) English Translation: The selected problems were translated into English by language and mathematics experts.

5) Trialing and Evaluation: The problem sets were tested by undergraduate and graduate students majoring in mathematics education, considering difficulty levels and appropriateness.

6) Collaborative Review: Faculty members and graduate students collectively reviewed the problems, focusing on language accuracy and alignment with educational objectives.

7) Final Language Check: A final check for language accuracy was performed according to the specified criteria.

8) Answer Sheet Design and Printing: The answer sheets were designed and printed for the 7 selected problems.

	Problem	Mathematical Olympiad Framework
1.	We can easily cut a 3x3x3 cube into 27 smaller cubes by making 6 cuts. Is it possible to reduce the number of cuts by dividing the cube to get multiple smaller cubes at once in a single cut, and rearrange the cut cubes?	Use of geometric facts
2.	There are a weighing scale and three weights. If we want to use the weighing scale and weights to measure anything with a weight ranging from 1 to 10 kilograms, what should be the weight of each of the three weights? Please provide an example of the weights of the three weights.	Divisibility or properties of decimal notation
3.	Please demonstrate how to cut the following picture into 12 equal parts (the conditions for equality are that they should be identical in both shape and size).	Constructive
4.	Nuit, the mystic writer, wants to pack 9 special animals with weights of 2, 3, 4, 5, 6, 7, 8, 9, and 10 kilograms into 3 travel bags. Each bag can only accommodate 3 animals, and the total weight must be less than 20 kilograms. If the weight of one animal is a multiple of the weight of another animal in the same bag, those two animals will fight each other. The question is, how will Nuit organize the special animals in the travel bags to prevent them from fighting?	Naive Combinatorics
5.	There are three triangular pieces of paper, placed on the table. Triangles 1 and 2 are smaller than Triangle 3. Is it possible to arrange Triangle 1 and Triangle 2 on top of Triangle 3 in a way that they completely fit, with Triangle 3 serving as the base for the other two triangles?	Use of geometric facts

Problem		Mathematical Olympiad Framework
6.	5 elephants and 7 hippos ate 11 round watermelons and 20 square watermelons for breakfast. In another group, 8 elephants and 4 hippos ate 20 round watermelons and 8 square watermelons. Each elephant ate the same number of round watermelons, and each hippo ate the same number of round watermelons. Likewise, each elephant ate the same number of square watermelons, and each hippo ate the same number of square watermelons. However, there is a type of animal that eats both round and square watermelons, while another type chooses to eat only watermelons of one shape. Which type of animal (elephant or hippo) eats only watermelons of one shape, and what is the shape of the watermelon they prefer?	Textual Problem
7.	In the magical land, there are a total of 15 cities. Each city is connected by paths to at least 7 other cities. Determine whether it is possible to drive from any one city to any other city using those paths.	Logical Tasks

Data Collection

The data for this research were collected from the Mathematical Festival, Thailand's 2nd edition, held for first-year high school students on Saturday, December 19, 2020. The assessment aimed to capture students' mathematical competencies in the form of expressing their thoughts and problem-solving methods during the festival. These data were instrumental for researchers to analyze and showcase students' mathematical competencies using the mathematical thinking framework of Isoda & Katagiri (2012), aligned with the content defined by the Moscow Center for Continuous Mathematical Education (MCCME, 2021).

4.1 Development of Data Collection Tools

A tool was created based on the structure of the Mathematical Festival's activities, modified from the original Moscow Mathematical Festival held at Moscow State University, Russia, for over 30 years. This tool facilitated the scheduling of activities for Thailand's 2nd Mathematical Festival on December 19, 2020.

4.2 Creation of Problem Sets for the Mathematical Olympiads

Problem sets for the Mathematical Olympiads were designed by translating and adapting original problem sets from the Moscow Mathematical Olympiads. These were developed by experts from the Moscow Center for Continuous Mathematical Education (MCCME) in collaboration with Thai experts. The problem sets covered six content areas to comprehensively assess students' mathematical competencies:
   1) Use of geometric facts
   2) Divisibility or properties of decimal notation
   3) Constructive
   4) Naive Combinatorics
   5) Textual Problem
   6) Logical Tasks

4.3 Development of Mathematical Games:

Mathematical games were created based on the original games used by MCCME in the Moscow Mathematical Festival. Trial plays were conducted to ensure a mutual understanding among the Thai organizing team. The games aimed to engage each student in various perspectives, emphasizing active participation to maximize learning outcomes.

4.4 Data Collection Process:

Data collection involved implementing the problem sets and mathematical games developed during the research tool creation process at the Mathematical Festival in Thailand, held on December 19, 2020. The participants were first-year high school students, totaling 124 individuals, as per the predetermined schedule.

Data Analysis

Qualitative data analysis was employed, utilizing information in the form of concepts, processes, or demonstrated methods for finding students' answers, as manifested on answer sheets. This analysis focused on students' explanations of concepts or methods used to arrive at solutions, aligning with mathematical thinking related to mathematical content. The content, as defined by experts from the Moscow Center for Continuous Mathematical Education (MCCME, 2021), covered six dimensions: 1) use of geometric facts, 2) division or properties of decimals, 3) constructive problem-solving, 4) combinatorics, 5) textual problems, and 6) logical problems. These dimensions were designed to assess students' mathematical competencies.

The study focused on nine mathematical ideas that represent various facets of students' mathematical competencies. These ideas are 1) Idea of Sets, 2) Units, 3) Representation, 4) Operation, 5) Algorithms, 6) Approximations, 7) Fundamental Properties, 8) Functional Thinking, and 9) Idea of Expressions. The analysis aimed to decipher students' mathematical competencies by exploring their mathematical thinking aligned with these nine concepts.
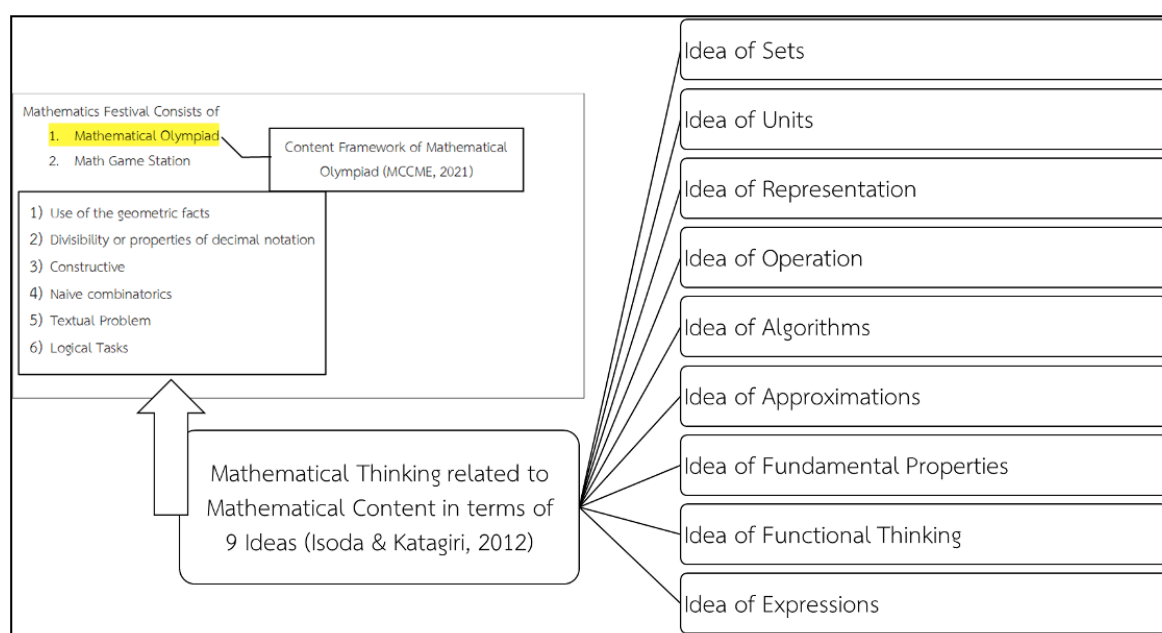
Figure 4: Data collection and analysis research framework.

In conclusion, the data analysis involved a comprehensive examination of students' responses using a qualitative approach. This approach, guided by the framework of Isoda & Katagiri (2012) and informed by the Moscow Center for Continuous Mathematical Education's content dimensions, aimed to unravel the depth of students' mathematical competencies across the identified mathematical ideas.

Results

From the analysis of mathematical competency assessments among first-year secondary school students, the conceptualization and problem-solving approaches adopted by students in tackling mathematical problems are presented. The analysis is based on the evaluation of students' mathematical competencies through the demonstration of mathematical reasoning related to the Mathematical Olympiad framework (MCCME, 2021). The framework encompasses content for each problem and is designed to cover various mathematical aspects. The analytical approach is aligned with the mathematical thinking framework proposed by Isoda & Katagiri (2012), as detailed in the following table.

Mathematical Thinking related to Mathematical Content in terms of 9 Ideas (Isoda & Katagiri, 2012)	Content Framework of Mathematical Olympiad by MCCME (2021)						
	Problem 1: Use of the geometric facts	Problem 2: Divisibility or properties of decimal notation	Problem 3: Constructive	Problem 4: Naive Combinatorics	Problem 5: Use of the geometric facts	Problem 6: Textual Problem	Problem 7: Logical Tasks
(a) Idea of Sets	✓	✓	✓	✓	✓	✓	✓
(b) Idea of Units	✓		✓			✓	
(c) Idea of Representation	✓	✓	✓	✓	✓	✓	✓
(d) Idea of Operation	✓	✓	✓	✓	✓	✓	✓
(e) Idea of Algorithms	✓	✓	✓	✓	✓	✓	✓
(f) Idea of Approximations	✓	✓				✓	
(g) Idea of Fundamental Properties	✓	✓	✓	✓	✓		✓
(h) Idea of Functional Thinking	✓			✓	✓	✓	
(i) Idea of Expressions	✓			✓	✓	✓	✓

Figure 5: Summary of mathematical ideas of students evident in the Mathematical Olympiad

Conclusion

In conclusion, this research indicated that the Mathematics Olympiad functions as a tool for assessing the mathematical competencies of seventh-grade students. The findings imply that students have the ability to exhibit their mathematical competencies through their mathematical thinking in terms of Isoda and Katagiri's (2012) conceptual framework: Idea of

Sets; Units; Representation; Operation; Algorithms; Approximations; Fundamental Properties; Functional Thinking, and Idea of Expressions.

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Establishing Norm Reference for SLI Children in Mainland China

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Abstract

This study aims to establish a norm reference of children's language development level. As many psychological-medical assessing tools are available for testing children's language development or impairment, treatments from medical institutions and professions are often involved. However, a testing instrument designed for early detection of SLI children for in-service teachers is needed. The Assessment of Language Impairments in School-age Children Scale developed by the National Taiwan Normal University was used in this study to establish a norm reference for children of school age in northern Jiangsu Province in Mainland China. Modification and justifications of items were made for better cultural-historical adaption of being used. All 102 participants were from an elementary school in Xuzhou City of Jiangsu Province. The results of each school age were calculated and compared with a norm reference established in Taiwan. The results showed that although the means don't have much difference, the cut-off scores of M-1.5 SD showed significant differences. The results also showed 6 out of 102 were diagnosed against the new norm reference, while five were diagnosed against NTNU's norm reference in Taiwan. However, the one who wasn't diagnosed against NTNU's norm reference in Taiwan scored 60, which was very close to the cut-off of 59.77. Thus, the diagnostic odds ratio in our study was between 4.42%-5.30%, which falls into the generally understood range of 5%-7%. Further study is needed for more participants from different regions for all school ages.

Keywords: Specific Language Impairment (SLI), Reference Norm, Diagnostic

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Introduction

Specific Language Impairment (SLI) is a developmental disorder that affects language acquisition in children, leading to difficulties in linguistic skills without concurrent cognitive, sensory, or neurological impairments. While SLI has been extensively studied in Western countries, its recognition and understanding in China present a unique set of challenges and opportunities. This comprehensive exploration delves into the historical context, cultural influences, current state of recognition, diagnosis, and intervention strategies related to Specific Language Impairment in China.

According to statistics, the prevalence rate of language barriers among school-age children in Taiwan was 3.3% in the 2008 school year (Lin, B., 2016, p.2). According to The University of Kansas, the prevalence of children with specific language impairment is 7-10% (Rice, n/d, p.2). The prediction of the prevalence rate (morbidity rate) of SLI in the current academic circle is generally based on the Tomblin et al. (1997) study of 7.4%, 8% for males, and 6% for females. The prevalence rate of a class in the third grade of participating children in this study is 7.5-12.5%, which is higher than Taiwan and international references. However, it may also be due to the small number of test samples.

Specific Language Impairment (SLI) is a developmental disorder, also called the Developmental Language Disorder (DLD), in children with lower language capacity than average children in the same age group without vivid physical or mental illness. Characteristics of children with SLI are generally described by Dorothy V.M. Bishop (2006) and Leonard (2014) in terms of the criteria of SLI:
1. The children's language expression and compression on standardized tests are considerably less effective
2. Nonverbal IQ and nonlinguistic traits are within the normal range
3. Hearing loss, physical abnormalities of the speech apparatus or environmental deprivation cannot be accounted for as causes of language difficulties
4. Brain damage is not the cause of language difficulties

Children with SLI may experience the following, as depicted by Rice (2020) and Dorothy V.M. Bishop (2006) suggested that:
1. Have no hearing loss or other developmental delays
2. Affecting 7-10% of children
3. Usually persistent into adulthood
4. Not likely to be identified (clinically) for services to help with their language impairment, so:
5. A high risk for reading impairments
6. Lower-than-expected academic achievement
7. Difficulties in establishing peer relationships
8. A heightened risk for peer victimization as a student (bully, marginalized)
9. Increased risk of being identified as having an Attention Deficit Disorder (ADHD), Auditory Processing Disorder (APD), and Autism.

In addition, language disorders or impairments in children are under-recognized compared to other neurodevelopmental conditions such as attention deficit hyperactivity disorder (ADHD), autism spectrum disorder, and developmental dyslexia. (D. V. Bishop & Leonard, 2014, p. 2) In other words, SLI is more exclusive compared with Developmental Language Disorder, or DLD. DLD diagnoses include children with lower IQs and co-occurring conditions (e.g.,

ADHD, DCD, dyslexia), whereas DLD diagnoses include children with lower IQs and co-occurring conditions (Dorothy V. M. Bishop, 2017).

Understanding the historical context of language development and disorders in China is crucial to comprehend the trajectory of SLI recognition. Historically, Chinese culture has held a distinctive approach to education, emphasizing rote memorization and academic achievement. The focus on linguistic precision, as seen in the Chinese writing system, has shaped societal expectations regarding language skills.

In the past, developmental disorders, including language impairments, were often stigmatized or overlooked due to cultural norms and limited awareness. However, as China undergoes rapid societal changes and embraces a more inclusive approach to education, there is a growing acknowledgment of the importance of recognizing and addressing developmental challenges in children.

Chinese culture places a significant emphasis on collectivism, where conformity and harmony are highly valued. This cultural context may influence how language difficulties are perceived within the family, school, and community. The desire to maintain social harmony might contribute to underreporting or masking of language impairments, as families may be hesitant to acknowledge and seek help for issues that could be perceived as deviating from societal norms.

In recent years, there has been a noticeable shift in the recognition of developmental disorders, including SLI, in China. The government and educational institutions have made efforts to raise awareness and provide resources for identifying and supporting children with special needs. However, the understanding of SLI specifically may still be in the early stages.

Challenges in recognition include the lack of standardized screening tools in Mandarin Chinese and dialects, making it challenging to identify language impairments accurately. Additionally, the variability in language development across regions and diverse linguistic backgrounds within China adds complexity to the recognition process.

Research studies exploring the prevalence of SLI in Chinese-speaking populations are emerging, contributing to a better understanding of the scope of the issue. Collaborations between researchers, educators, and healthcare professionals are essential to develop culturally sensitive assessment methods and diagnostic criteria for SLI in the Chinese context.

Diagnosing SLI involves a comprehensive assessment of a child's language skills, considering both expressive and receptive language abilities. In China, the lack of standardized assessment tools tailored to the linguistic and cultural nuances poses a challenge. Adapting existing tools or developing new assessments that align with the linguistic characteristics of Mandarin Chinese and regional dialects is imperative for accurate diagnosis.

Moreover, the assessment process needs to consider cultural factors that may impact language use and comprehension. For instance, communication styles within Chinese families, hierarchical dynamics, and expectations regarding language proficiency may influence a child's performance during assessments.

Collaboration between speech-language pathologists, psychologists, educators, and parents is essential for a holistic evaluation. Integrating input from multiple sources can provide a more comprehensive understanding of the child's linguistic abilities and potential areas of difficulty.

In order to identify children with possible SLI, we need a norm reference to address the developmental level of children in different school ages of children. As the norm reference established in one cultural-historical area, it's more meaningful to evaluate those children and design appropriate help accordingly.

Method

The Specific Language Impairment Checklist evaluates certain aspects of language impairment that standardized language tests adequately assess. A preliminary regional norm was established based on a study of 102 school-aged children. Based on the Development of the Specific Language Impairment Checklist, the scale developed by Qi (2008) and published by the Center of Special Education, National Taiwan Normal University in Taiwan, we have preliminarily evaluated 42 school-aged children, consulted linguistic scholars and primary school Chinese language teachers to modify questions and pictures of this scale to adapt to the linguistical cultural-historical context of the Xuzhou region of Jiangsu Province in Mainland China. These check list items were then divided into eight scales, which include language-related learning difficulties, semantic difficulties, syntactic difficulties, narrative difficulties, word-finding problems, auditory perception/memory, auditory comprehension, and language-related communication problems. The scores obtained from the checklist were also able to distinguish between children who may have language learning problems and those who do not.

Results

First, the overall Mean and M-1.5 SD are reported against original data from Qi (2008) and published by NTNU. As shown in Table 1.

Table 1: *Overall comparison between Mean to NTNU/Qi (2008)*

	age	NTNU Mean	M-1.5SD	XuZhou Mean	M-1.5SD
Llanguage Comprehension	6	27.90	20.21	27.20	20.13
	7	30.69	23.84	31.53	28.09
	8	32.97	27.30	32.14	27.94
	9	33.54	27.39	35.05	29.67
	10	35.11	30.46	35.67	31.87
	11	36.09	31.77	35.45	33.01
	12	36.64	32.73	39.00	39.00
Oral Expression	6	35.20	23.30	34.60	27.76
	7	38.13	26.97	35.76	24.14
	8	40.38	30.61	39.64	33.37
	9	42.93	32.22	40.19	30.02
	10	45.21	34.73	44.14	38.29
	11	46.50	37.52	43.09	37.24
	12	47.50	37.83	46.50	41.20
Language Development	6	63.11	45.62	61.80	48.75
	7	68.82	52.76	67.29	53.63
	8	73.35	59.77	71.79	62.69
	9	76.47	61.65	74.05	55.00
	10	80.33	67.11	79.81	71.48
	11	82.59	71.14	78.55	71.59
	12	84.15	71.74	85.50	80.20

The Mean and M-1.5 SD Xuzhou data values aligned with NTNU's norm reference except for the 12-year-old age group due to sufficient samples participating.

Conclusion

A regional, localized norm reference is needed in the Xuzhou area as we are trying to help school-aged children in their early stages of SLI as soon as possible. Therefore, from an educator's perspective, we can distinguish between children with possible language learning difficulties in resource classrooms and children in regular classrooms. This study established a preliminary norm reference using data from 102 local children. Finally, the scores obtained from the checklist were compared against the original data from NTNU/Qi in Taiwan. The results are close, and further data collection is needed for a broader base of children in the Xuzhou area.

Acknowledgements

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Confluence of Virtual Learning Environments and Virtual Reality Integration: An In-Depth Study in Digital Animation Education for Acceptance Among Learners

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Abstract

As innovation continues to reshape educational landscapes, this study delves into the intricate intersection of virtual learning environments and the integration of virtual reality (VR) within the realm of advanced animation education. Drawing from the latest advancements and methodologies, this research examines the convergence of learner perceptions and acceptance within this dynamic context. Through a comprehensive case-study approach, encompassing learner engagement and adoption patterns, this investigation sheds light on the intricate interplay between virtual learning environments and the incorporation of VR technology. The findings provide valuable insights into the multifaceted factors influencing learner acceptance, anticipation of learner experiences, educational effectiveness, and technological affordances. A total of 86 digital animation learners who completed questionnaires based on the Technology Acceptance Model (TAM) and the quality of the learning activity were included in this study. The students perceived the value of the training activity as significant, with substantial correlations observed among various dimensions. This research illustrates the potential of VR as an educational technology and offers fresh perspectives for future research. By synthesizing these technologies with real-world applications, this study contributes significantly to the scholarly discourse surrounding innovative pedagogical frameworks and optimal models, thereby promoting a deeper understanding of how learners embrace and engage with virtual reality in advanced digital animation education.

Keywords: Virtual Learning, Virtual Reality, Technology Acceptance Model, University Education, Digital Animation

Introduction

The integration of digital animation and VR in higher education also revolutionizes skills development. Through the use of these technologies, students can practice and refine technical skills in a simulated environment, allowing for repetitive practice without the need for expensive equipment or physical resources (Pringle et al., 2022). For example, aspiring surgeons can perform virtual surgeries, engineering students can design and test prototypes, and art students can experiment with different artistic techniques, all within a virtual space. This not only enhances their proficiency in their respective fields but also fosters a sense of confidence and competence. Furthermore, the merging of digital animation and VR opens up new avenues for educational innovation. Traditional teaching methods often rely on lectures and textbooks, which can be passive and detached from real-world applications. However, with the immersive and interactive nature of these technologies, educators can create dynamic and engaging learning experiences that cater to different learning styles (Wang et al., 2020). Students can actively participate in their own education, exploring concepts and theories in a hands-on manner (Chuang, 2021). This promotes critical thinking, problem-solving, and creativity, skills that are highly valued in today's rapidly evolving job market.

Additionally, the connecting of digital animation and VR in higher education has the potential to democratize access to education. With the increasing availability and affordability of VR headsets and animation software, students from all backgrounds can have equal opportunities to engage in immersive learning experiences (Bodzin et al., 2020). This can bridge the gap between traditional classroom settings and remote or online learning, providing a more inclusive and accessible education for all. The merging of digital animation and VR in higher education has the power to redefine the way we learn and teach. By harnessing the unique capabilities of each technology, students can unleash their creativity, develop practical skills, and engage in immersive and interactive learning experiences (Sukirman et al., 2021). This transformative convergence holds immense potential for the future of higher education, paving the way for innovative approaches to creative expression, skills development, and educational exploration.

The merging of digital animation and VR will also revolutionize skill development, providing students with a comprehensive toolkit of industry-relevant expertise. While digital animation hone artistic expression, storytelling skills, and proficiency in animation software, VR expands technical capabilities to include 3D modeling, spatial design, and user experience (UX) principles. These skills are in high demand across a wide range of industries, including film, gaming, healthcare, education, and architecture, and open the door to a variety of career paths. Additionally, this fusion of technologies fosters interdisciplinary collaboration that leverages expertise in computer science, art, design, storytelling, and psychology. Students engage in interdisciplinary teamwork to navigate diverse perspectives and integrate knowledge to create innovative and impactful digital experiences. Such collaborations reflect the realities of professional creative industries and prepare graduates for the dynamic and collaborative nature of the modern workplace. Despite the transformative potential of these technologies, integrating these technologies into higher education is hampered by hardware and software costs, accessibility issues, and the need for specialized training for both faculty and students. Issues such as this arise. Overcoming these hurdles requires strategic investments, innovative educational approaches, and continued research to ensure equitable access and effective implementation. In summary, the convergence of digital animation and VR technology heralds a paradigm shift in higher education that redefines the boundaries of creative expression, skill development, and immersive learning experiences. Although

challenges remain, the potential to develop a generation of graduates with the artistic vision, technical skills, and collaborative mindset needed to succeed in a digitalized world is undeniable. By leveraging this convergence, institutions can help students shape a future where imagination and technology intertwine, creating endless possibilities for storytelling, innovation, and meaningful impact across diverse disciplines.

Methodology

The purpose of this study was to explore the willingness of students from university in Malaysia to use web-based virtual reality systems-based learning. To achieve this, the researchers adopted purposive sampling methods to select students who were taking or had taken courses related to digital animation production. Out of the 110 questionnaires distributed, 24 were found to be invalid, while 86 were valid. The questionnaires were completed online for convenience. The questionnaire consists of a 5-point Likert scale ranging from "strongly disagree" (1) to "strongly agree" (5), and 20 questions to measure variables that may affect the use of VR technology. We got 110 responses; 24 responses were excluded due to incompletion. After cleaning and preparing the data set, data were analyzed using SPSS version 26 and Excel.

This study specifically focused on full digital animation learning; However, the study specifically emphasized the importance of vr as the foundation of digital animation learning and development. By conducting the research, the aim was to contribute to the understanding and advancement of knowledge in the field of vr learning platform.

Semi-immersive virtual experiences offer participants a unique blend of virtual and physical reality, allowing them to feel as though they are in an alternate world while still maintaining a connection to their surroundings (Dincelli & Yayla, 2022). This type of technology utilizes 3D graphics to create a sense of depth and realism, known as vertical reality depth, which enhances the level of immersion. By incorporating more intricate graphics, the experience becomes even more lifelike.

One of the main advantages of semi-immersive virtual experiences is their applicability in educational and training contexts. These experiences can be used to simulate real-world scenarios and provide learners with a safe and controlled environment to practice and develop their skills (Bryant et al, 2019). For example, medical students can use semi-immersive virtual experiences to perform virtual surgeries, allowing them to gain valuable hands-on experience before working with real patients. To create these semi-immersive experiences, high-resolution displays, powerful computers, projectors, or sophisticated simulators are often used. These technologies replicate certain aspects of real-world mechanisms in a partial manner, allowing participants to interact with virtual objects and environments in a realistic way. This level of realism helps to enhance the learning experience and make it more engaging and memorable.

In addition to educational and training applications, semi-immersive virtual experiences can also be used for entertainment purposes. Virtual reality gaming, for example, often falls into this category. Players can immerse themselves in virtual worlds and interact with characters and objects in a way that feels incredibly real. This type of entertainment experience can be highly engaging and provide a unique form of escapism. This technology has found frequent application in educational and training contexts, as well as in entertainment. With the

continued advancement of graphics and technology, the possibilities for semi-immersive virtual experiences are only expected to grow.
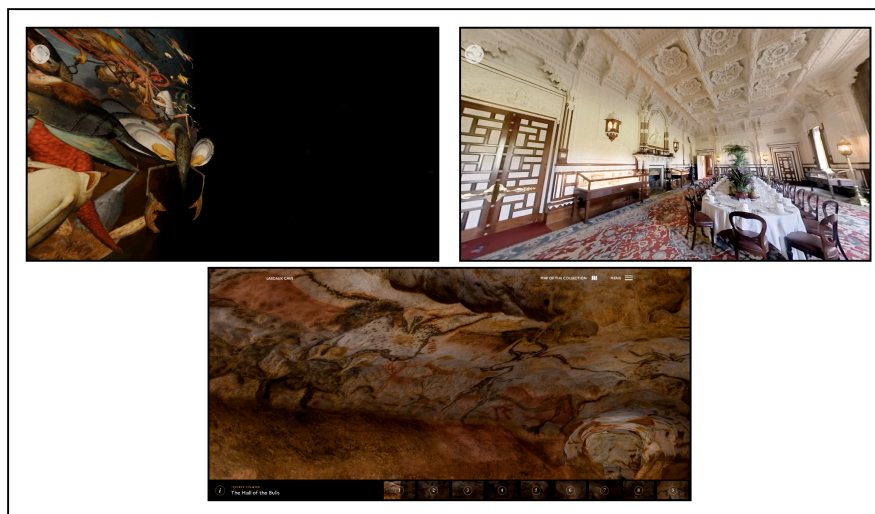

Figure 1: The screenshot of learning materials on different animation techniques.

Data Collection and Analysis

The technology acceptance model can provide empirical explanation regarding users' acceptance of a new information technology. The concept of computer self-efficacy can enhance the explanatory potential of the model (Wang et al., 2023). Built on the theoretical foundation of the technology acceptance model and computer self-efficacy, this research produced a questionnaire to explore user's willingness to adopt a virtual reality assessment system.

This study used Cronbach α as a measure of internal consistency among technical areas included in the item bank. The Cronbach α value of the item bank as a whole was 0.85, proving that the reliability of the item bank was good. To establish expert validity, questions in the item bank were revised according to opinions from post-review discussions with experts and scholars. After the revision, professionals with more than five years of experiences in virtual reality production spent twenty-minutes each trying out the assessment system. Based on their feedback, those questions unclearly expressed were further revised to ensure good content validity. Hence, the item bank used in this study had excellent validity. Lists reliability and validity values of each dimension in the questionnaire and the questionnaire as a whole. internal consistency of each dimension in the questionnaire was evaluated. Cronbach alpha coefficients of dimensions of perceived usefulness, perceived ease of use, users' willingness, and computer self-efficacy are respectively 0.933, 0.851, 0.919and 0.963, respectively. All Cronbach α coefficients were between 0.85 and 0.96, indicating good reliability and good internal consistency of the questionnaire. Good convergent validity means factor loadings of all questions need to reach significant level. In other words, all values need to be above 0.5. In this research, all average variances extracted (AVE) were above 0.8, indicating good validity as shown at Table 1.

Reliability and validity of the questionnaire		
	Cronbach's α	AVE values
Perceived usefulness	0.933	0.90
Perceived ease of use	0.851	0.82
Users' willingness	0.919	0.92
Computer self-efficacy	0.963	0.89
Overall reliability	0.956	

Table 1: Reliability and validity of the questionnaire

Hypothesis	Relationship between Variables	Path Coefficient
H1	Self-efficacy positively correlates with perceived usefulness	0.812 **
H2	Self-efficacy positively correlates with perceived ease of use	0.793 **
H3	Perceived usefulness has a positive effect on users' willingness	0.681 **
H4	Perceived ease of use has a positive effect on users' willingness	0.292**

Table 2: The relationship between variables and the value of path coefficient

This study utilizes the technology acceptance model (TAM) as a foundational framework to investigate the connections between perceived usefulness, perceived ease of use, self-efficacy, and users' willingness in relation to a virtual reality platform's performance assessment system. A model of relationships was established based on the aforementioned findings. The findings revealed that users' perceived usefulness and perceived ease of use directly impact their willingness to adopt an e-book production assessment system.

Specifically, the influence of perceived usefulness (0.68) was found to be more significant than that of perceived ease of use (0.30). The study also found that subjects' computer self-efficacy had a significant and positive influence on their perceived usefulness and perceived ease of use as stated in Table 2. Furthermore, subjects' perceived usefulness and perceived ease of use had a significant and positive influence on their willingness to use the system. Therefore, individuals with higher computer self-efficacy and a greater perception of the usefulness and ease of use of the web-based assessment system are more inclined to use the system. Path analysis results from the study indicate that perceived usefulness and perceived ease of use act as mediators in the relationship between self-efficacy and users' willingness. Additionally, a high level of self-efficacy may contribute to improved learning performance among students. This finding aligns with previous studies that have explored the connection between computer self-efficacy and learning outcomes.

Conclusion

In conclusion, within the Malaysian context, the continuous collaboration between Virtual Learning Environments (VLEs) and Virtual Reality Integration (VRI) presents a groundbreaking and transformative approach to digital animation education. The integration of VLEs and VRI has garnered resoundingly positive engagement and feedback from students, reinforcing its efficacy in fostering a positive and immersive learning experience (Makransky & Petersen, 2021). In future work, the research would undertake as following: (1) increasing the sample size as this will give us a better indication of the acceptance of vr technology; (2) measuring other factors such as immersion, scalability, and diversity; (3) involve a diverse segment of educated and uneducated volunteers to fill out the questionnaire.

By measuring the previous factors in point 2 and examining the influence relationship between the factors with a large sample of diverse segment of educated and uneducated volunteers, research will bring a more detailed view of the Metaverse technology. By harnessing the power of VLEs and VRI, students are provided with a dynamic and interactive educational environment that transcends traditional teaching methods. This cutting-edge integration not only enhances student engagement but also nurtures their creativity and critical thinking skills.

The immersive nature of VRI allows students to experience real-world scenarios and challenges within the digital animation field, providing them with practical skills and preparing them for the demands of the industry. This experiential learning approach has been met with interest and appreciation from students, who report a heightened sense of motivation and excitement in their educational journey. Furthermore, the collaborative nature of VLEs and VRI encourages peer interaction and collaboration, fostering a sense of community among students. This collaborative learning environment not only enhances student learning outcomes but also cultivates teamwork and communication skills that are essential in today's interconnected world (Wu et al., 2021).

The overwhelmingly positive engagement and feedback from students serve as a testament to the immense potential of integrating VLEs and VRI in the Malaysian education system. This integration represents a significant step forward in shaping the future of immersive and engaging learning experiences, empowering students to become adaptable and well-prepared for the evolving digital animation landscape.

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Integration's Learning Outcome Through Game-Based Learning and Cultural Practices Among Learners: Edutainment Platform

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Abstract

The integration of Game-based learning (GBL) with cultural learning is feasible and advantageous. GBL facilitates the comprehension of cultural education embedded within the gaming context. Numerous contemporary pedagogical and instructional approaches have transcended the conventional confines of classroom-based learning, extending their purview to encompass the integration of technology-enhanced educational paradigms. Among these approaches, GBL stands out as an unequivocal exemplar, seamlessly amalgamating technological tools into its framework. This pedagogical modality possesses the inherent capacity to invigorate learners' motivation to acquire knowledge while concurrently fostering moments of intellectual revelation. The edutainment platform offers opportunities for GBL and cultural practice. "The Confucius Roll Call" game is an exemplar of the games found within such edutainment platforms. A narrative dataset obtained through the observational method and open ended interview questions will be analyzed, focusing on the participation of 8 learners engaged in the study of Confucius' culture using the "Confucius Roll Call" game. The 8 learners were aged between 20 and 23. They were participants in cultural leisure class. This analysis aims to uncover insights into the positive and negative learning outcomes achieved through the integration of GBL and cultural practices within the context of Confucius' culture education. This research has the potential to offer educators and learners valuable insights into enhancing the effectiveness of learning and education through the integration of Game-Based Learning and cultural practices.

Keywords: Game-Based Learning (GBL), Learning Outcome; Cultural Leisure Class, Cultural Practices, Edutainment Platform

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Introduction

Definitions of game-based learning predominantly emphasize that it constitutes a form of gameplay designed to achieve specific learning outcomes (Shaffer, Halverson, Squire, & Gee, 2005). Game-based learning (GBL) broadly refers to the utilization of video games to facilitate and enhance teaching and learning. Various studies articulate and interpret this comprehensive definition in diverse ways. (Perrotta, 2013). GBL is the game itself serves as the primary instructional tool, in contrast to gamification, which entails the integration of game elements into conventional learning activities. (Buckley & Doyle, 2014). At the same time, the design process for educational games entails a delicate balance between covering the subject matter and prioritizing gameplay (Plass et al., 2015).

In the context of cultural learning, utilizing GBL can yield substantial educational benefits. In the realm of cultural learning, GBL can yield both positive and negative educational outcomes. So, GBL serves as an effective method for cultural education. Cultural knowledge is integrated into the content of GBL game design, facilitating a mutual enhancement between culture and GBL design. Through GBL, learners not only gain access to often mundane cultural information but also derive enjoyment from the learning process (Jossan et al., 2021).

At present, the edutainment platform hosts a myriad of games, some of which encompass cultural content. Hence, acquiring cultural knowledge via cultural games on the edutainment platform constitutes a method of learning within the framework of GBL. In contemporary times, numerous educational and entertainment platforms feature cultural games centred around Chinese culture or Confucian culture. These games serve as a conduit for acquiring knowledge about both Chinese culture and Confucian values. "The Confucius Roll Call" is a cultural game embedded with Confucian values and knowledge, available on an edutainment platform. This research will employ the aforementioned game as a means to investigate the learning outcomes resulting from the integration of GBL and cultural education.

Literature Review

Game-based learning can be applied to the acquisition of knowledge in various subjects and fields. Whether it is science, literature, language, or any other subject, all can be learned through the GBL approach. Consequently, numerous scholars have analyzed the learning scenarios associated with the implementation of game-based learning. G,S. (2008) study elucidates the effectiveness of Video Game-Based Learning in English Grammar at the sixth-grade level Noroozi et al. (2020) explore a systematic review provides an overview of the current state of the art concerning the utilization of Game-Based Learning (GBL) for enhancing argumentation skills in digital learning. Hsin-Yi Liang & Tien-Yu Hsu (2020) explore a game-based learning service for science museums that can offer a lifelong edutainment environment with flexible options for the public and serve as a valuable interdisciplinary learning resource to support competency-based education.

The design models for game-based learning are also a subject of considerable scholarly interest, as an effective game design model is known to yield positive learning outcomes. Shi & Shih (2015) presents macro design concepts that elucidates 11 crucial game-design factors to construct a game-based learning design model. Besides that, the study proposed the GBL design model to assist in designing educational games. Zuiker et al. (2012) develops a cultural analysis of learning to comprehend the intersections between conceptual change and

game-based learning in Singapore. Additionally, they illustrate how the technologies and methodologies of video games inform the design of learning environments, analysing these designs within the framework of a sociocultural theory of conceptual change. Abdul Jabbar & Felicia (2015) investigated game design features that enhance engagement and learning in game-based learning (GBL) settings. Furthermore, the study illustrates the impact of key gaming features in GBL at both cognitive and emotional levels. Plass et al. (2015) asserted that in game-based learning, a synthesis of cognitive, motivational, affective, and sociocultural perspectives is essential for both game design and game research to comprehensively grasp the educational potential that games offer. The findings of Liu et al. (2014) demonstrate that the design of an engaging, interactive environment through a game-based approach can assist students in enjoying the learning process.

Methodology and Findings

A. Participant

The study focuses on eight participants (5 males, 3 females) between the ages of 20 and 23. (Refer to Table 1). This eight participants (named as learner) actively participated in cultural learning during leisure classes employing the GBL method. This research will employ observations and interviews to analyse the learning outcome of learners in cultural practice through GBL.

Learner's Profile	Age	Gender
Learner A	20	Male
Learner B	20	Male
Learner C	21	Male
Learner D	23	Female
Learner E	22	Male
Learner F	21	Female
Learner G	23	Male
Learner H	21	Female

Table 1: Learner's Profile

B. Results and Discussion

Through interviews with some questions, this research can gain insights into learners' acquisition of cultural knowledge through GBL. Learners typically opt for GBL as a means of cultural practice, primarily for several reasons: (1) Enjoyable & Fun, (2) Current trend (3) Acquire cultural content quickly, (4) Curious, (5) Stimulate interest of learner, (6) refreshing, (7) Impressive graphics, (8) Dynamic learning (Refer to table 2).

Learner's Profile	Reasons
Learner A	*I believe it can be enjoyable; after all, a significant portion of the learning content related to Confucian culture or Chinese culture is often conveyed through words. Games make it easier for me to engage with the material.*
Learner B	*I'm just interested in knowing about the latest games, what cultural content they include, and staying with the current trends.*

Learner C	It's fun. I can learn and practice cultural knowledge while playing games at the same time.
Learner D	I aim to learn through games to acquire cultural knowledge more rapidly.
Learner E	I opted to engage with Confucian culture through GBL because it doesn't feel as dull, but I acknowledge the need for patience due to the inherent challenges in the game.
Learner F	I'm just curious, and the game can stimulate my interest in learning about this culture.
Learner G	It feels very refreshing, so I want to give it a try. At the same time, I like learning in a dynamic way.
Learner H	The game has impressive graphics. I appreciate the learning method involving sound and graphics, as it makes the process less tedious.

Table 2: Reason for Choosing the GBL for Cultural Practice

In this study, by acquiring insights into learners' experiences, we can discern the positive and negative learning outcomes of cultural exercises through GBL methods (Refer to table 3).

Learner's Profile	Answers
Learner A	Because games are engaging, it help me absorb cultural knowledge and practice cultural activities more easily compared to traditional textbook learning. It's a positive learning effect. However, the challenge lies in getting distracted by the goal of advancing to the next level. I find myself sometimes neglecting the learning of pertinent cultural knowledge in pursuit of scores or progressing in the game. Often, my primary focus is just on obtaining the correct answers to pass a level.
Learner B	Sometimes, I find myself forgetting the content after playing a game. It takes repeated plays of related games before I can recall the relevant cultural knowledge. Usually, I don't go through the game repeatedly, but in leisure classes where everyone is playing together, it's okay to repeat it a few times.
Learner C	I tend to focus on learning relevant knowledge to score or pass a level. After a few attempts, I eventually memorize the pertinent cultural information. For instance, in "Confucius Roll Call" game, I learned the names of Confucius' students and their preferences.
Learner D	I believe games can immerse me in the cultural world more quickly, and I become more engaged in the learning process. Dynamic and visually appealing elements make the learning experience more energetic for me.
Learner E	Games are beneficial for learning about culture, but patience is key. After all, games often have challenging levels. If you provide an incorrect answer, it can hinder your progress, and you won't be able to continue playing. This aspect sometimes leaves me pondering the learning process.
Learner F	Games can ignite my enthusiasm and interest in learning, leading to positive learning outcomes.

| Learner G | *Dynamic learning has always been my favourite. I play related games multiple times until I successfully reach the last level.* |
| Learner H | *Learning through games is more captivating than studying textbooks, helping me grasp that Confucian culture in Chinese society places significant emphasis on etiquette.* |

Table 3: The learning experience about the cultural practice through GBL

In Table 3, the positive and negative learning outcomes of cultural practice through Game-Based Learning (GBL) are illustrated. There have three positive learning outcomes, (1) Easily to Absorb Content, (2) Dynamic and Visually Learning Effective, (3) Ignite Enthusiasm and Interest in Learning. Besides that, there have 3 negative learning outcomes, (1) Challenge Level & Score, (2) Memorize Challenging, (3) Patient Challenging. In light of these outcomes, it is advisable for educators and learners intending to employ GBL for cultural education to take note of the following issues and proposal given. The proposal emphasizes the preservation of a predominantly positive discourse surrounding learning outcomes, while also addressing and rectifying any negativity associated with such outcomes. Consequently, the recommendation is structured around five key points, (1) Motivational & Rewarding, (2) Game Selecting (Straightforward Game Level), (3) Play in Group, (4) Teach & learn Keywords of Content, (5) Dynamic &Visually Learning (Refer to Figure 1).
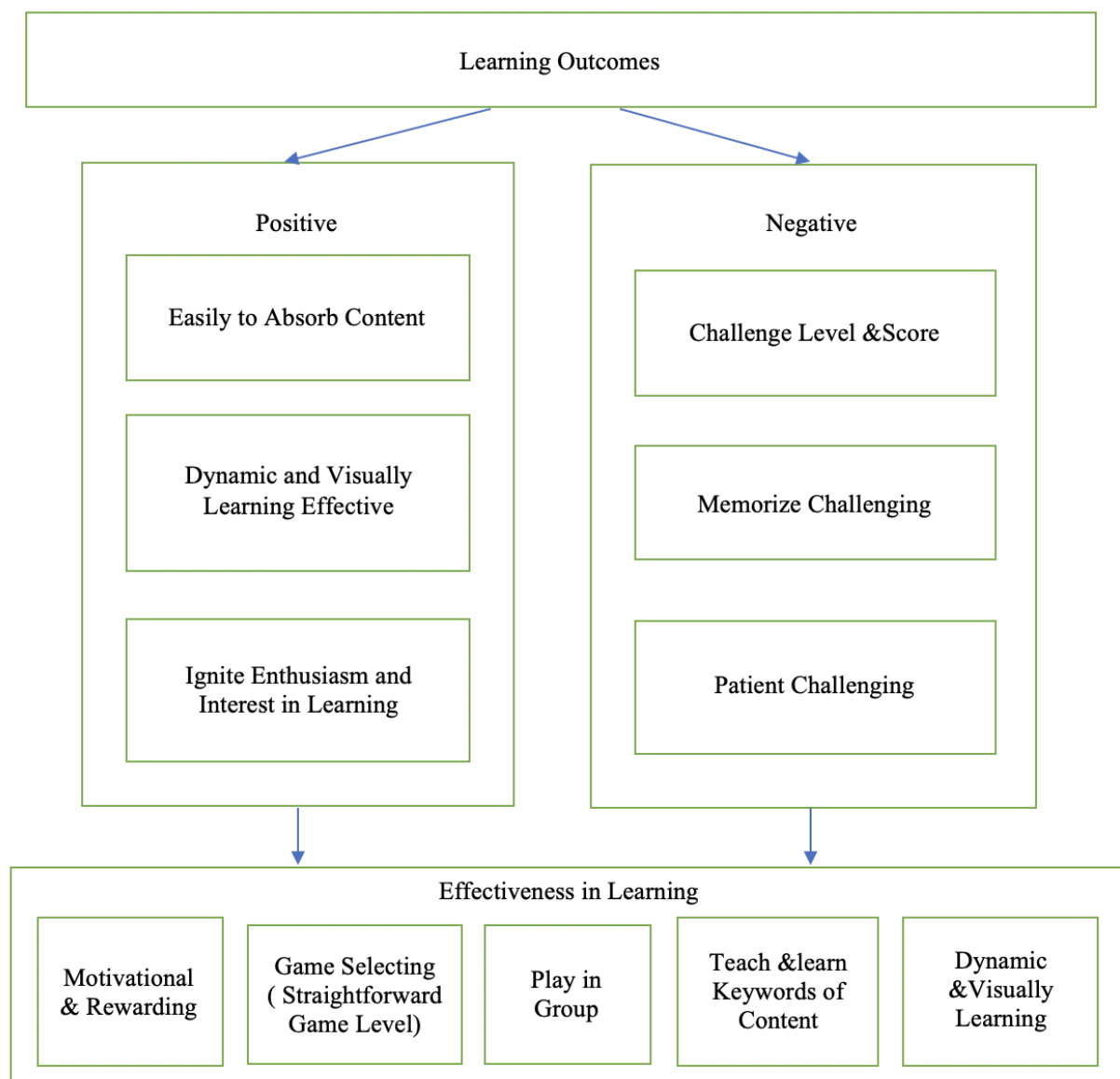
Figure 1: Proposal of the Effectiveness in Learning through the GBL

Conclusion

From this, this research can conclude that the integration of Game-Based Learning (GBL) yields both positive and negative learning outcomes in cultural learning. As an educator, addressing the negative learning outcomes caused by GBL can enhance teaching results in cultural course instruction. Simultaneously, from the learner's perspective, the acquisition of keywords in cultural knowledge can be enhanced, potentially alleviating issues related to unlearning. Additionally, teachers should prioritize students' emotional and psychological states when utilizing GBL for cultural learning, emphasizing these aspects over strict adherence to game rules and elements. While learners using GBL for cultural practice may absorb knowledge more rapidly and find the experience enjoyable, the design elements of the game could potentially impede learning speed and outcomes. This poses a question that necessitates reflection from educators and even game developers. The dynamic and graphic learning method in Game-Based Learning (GBL) indeed facilitates greater learner engagement. Consequently, this strength can be preserved and augmented in GBL instruction.

Acknowledgment

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Classroom Action Research
Using Peer Assessment as a Tool to Improve EFL Students' Speaking Skills

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Abstract

This study examines the impact of peer assessment and feedback on secondary school EFL (English as a Foreign Language) learners' speaking skills. By providing a platform for students to evaluate each other's performance, peer assessment can help overcome shyness and fear of making mistakes. The study employed CAR (Classroom Action Research) following Kemmis' cycle process (in McNiff: 1992:27) through planning, acting, observing, and reflecting in a spiral model. The evaluation focused on whether peer assessment was effective in developing EFL learners' speaking skills and how peer feedback affected students' speaking performance. The study involved 25 students of A2/B1 level at Nazarbayev Intellectual School in Kazakhstan. Personal observations, questionnaires, and speaking tests were used to collect data. Analysis of speaking results showed an increase from 63 in pre-test to 69 in Cycle 1 and 75 in Cycle 2, illustrating the effectiveness of peer assessment as a learning tool. However, giving feedback to peers was only effective in pair work between Higher- Average or Lower level students, with the latter sometimes struggling to implement constructive feedback to Higher level students. Despite drawbacks, most students had a positive attitude towards peer assessment and receiving feedback from their classmates. This form of assessment can be incredibly advantageous for students, offering a unique opportunity for self-learning and differentiation. Additionally, it provides teachers with a valuable tool for assessing their students' potential and enthusiasm.

Keywords: CAR, Peer Assessment, Speaking Skills Evaluation, Peer Feedback

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Introduction

When working with English as a Foreign Language (EFL) student, it is often observed that they face difficulties in overcoming shyness and lack of vocabulary when it comes to speaking. To assist less able students, differentiation in the learning process is often employed, such as providing question cards with keywords for less able students and role-playing as group work to give them a chance to speak freely within their roles and involve all students in the speaking process. However, organizing group and/or peer work for students often presents a challenge. Many students struggle with shyness and lack of confidence when it comes to speaking. Active students with higher levels of English tend to take part and provide their answers during topic-related questions and/or discussions, while other students remain silent. Most EFL students often lack vocabulary or ideas, and they also feel embarrassed to speak in a foreign language. Assessing the performance of a certain student's contribution in pair or group work becomes difficult under such circumstances. The current study aims to address the following research questions: "Is peer assessment effective in developing EFL students' speaking skills?" and "How does peer feedback affect students' speaking performance?"

Literature Review

According to Topping (2009), the utilization of peer assessment as an assessment method in the field of education has risen in recent decades. This approach emphasizes collaborative learning with peers and is based on effective learning while being supervised by the instructor. Scholars such as van Zundert et al. (2010), Black and Wiliam (1998a), and Topping (1998) agree that assessment shapes much of the learning that students do, and changing the assessment method can change the way students learn and the content they learn. Nowadays, many scholars justify the use of self and peer assessment as it can lead to greater ownership of learning and motivation for learners. In the realm of EFL teaching, assessment is believed to be crucial in developing students' ability to evaluate their performance and improve it. According to John Cowan (2005), assessment is considered the driving force behind students' learning. Peer assessment can help learners develop several skills like reflection, critical thinking, and self-awareness while giving them insights into the assessment process. The study aims to investigate whether peer assessment can enhance EFL learners' speaking abilities and whether peer feedback can be as useful as teacher feedback, along with other benefits it may offer.

Topping (2017) defines peer assessment as an arrangement for learners to consider and specify the quality product, of other equal-status learners, which leads to learning further, by giving elaborated feedback to achieve a negotiated agreed outcome. In other words, peer assessment is a valuable pedagogical practice as it enables the learners to take part in assessment by evaluating their peers' learning process and products (Bryan & Clegg, 2019).

Peer assessment incorporating peer feedback leads to more beneficial outcomes as peer feedback provides the strengths and weaknesses along with recommendations for improvement. Furthermore, peer feedback means having a dialogue whereby students share knowledge and understanding with the intention of informing as ongoing learning (Zhu & Carless, 2018).

An important aspect of peer assessment and feedback practices is the link of these activities to Vygotsky's (1978) social development theory, which emphasizes the vital role of social

interaction in learning (Lundstorm & Baker, 2009; Topping, 2017). Further, it is claimed that the peer assessment process naturally constructs a favourable teaching environment for peers to work within the zone of proximal development (ZPD) (De Guerrero & Villamil, 2000). The learner's ZPD refers to the place between where learners are able to perform a task on their own versus with the help of a teacher or parent (Lundstorm & Baker, 2009). The theoretical framework of Vygotsky's social development theory refers to two important aspects of peer assessment and peer feedback: *cognitive development* and learning through social interaction which can be implied as *collaborative learning*.

According to one of the first advocates of peer assessment, cognitive and metacognitive benefits can accrue before, during, or after the peer assessment (Topping, 2009). Learners assess their peers speaking according to speaking criteria, in the process, they can see their own mistakes, strengths and weaknesses.

Methodology

To ensure the validity of the action research, a triangulation approach was employed with a variety of research instruments and techniques that could provide different views of the case. Qualitative and quantitative research methodologies were used, which encompassed three distinct data collection tools:
- Personal observations;
- Survey: speaking tests with assessment criteria;
- Survey questionnaire.

Survey participants:
　　25 students of NIS in Kazakhstan with English language levels A2 / B1.

Procedure

This study adopted a spiral model of Kemmis's classroom action research (2007). In general, the spiral model of classroom action research (CAR) describes a continuous process that includes two iterations where each cycle goes through the process of gathering information, planning, implementing actions, observing and reflecting on actions and then designing actions in the next cycle, which were based on facts and findings from the previous cycle (Figure 1). In planning stage, the researcher planned the implementation of question cards and peer assessment, prepared topic-related vocabulary, designed a lesson plan, made assessment sheet and determined criteria of success. In the implementation stage the researcher applied the strategy by pairing students randomly and in observation stage the researcher collected the data. In the reflecting stage, the researcher evaluated the result of the implementation of the strategy and drew the conclusion whether the strategy was success or not by comparing to the criteria of success.
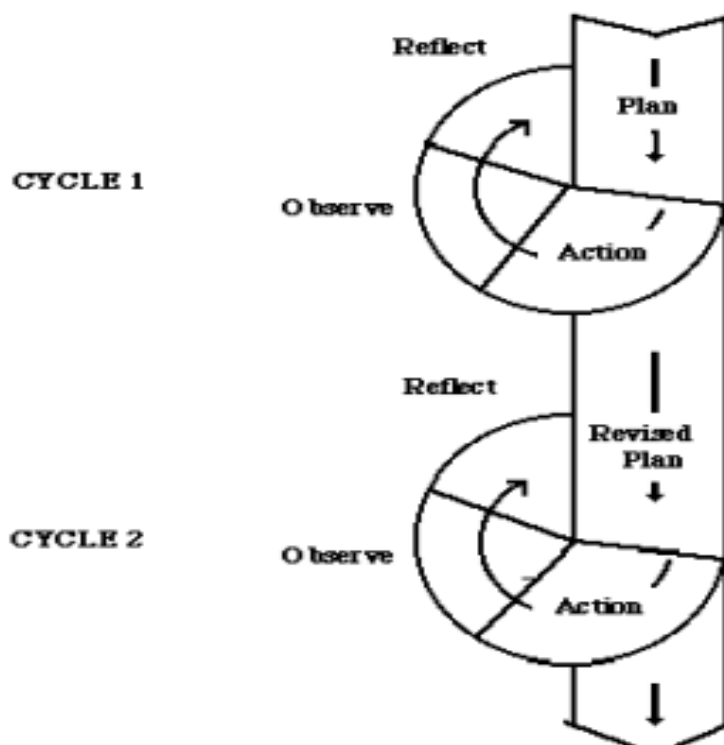
Figure 1: Kemmis' cycle action research process

Findings and Discussion

The research lasted for 2 months of the last academic year 2022-2023 and divided into three main stages. In the first stage students were merely observed during speaking activities for 4 lessons, the researcher was trying to find out how free and fluently students can render their ideas when answering topic-related questions. By the end of the observations, it was possible to assess the participation of only the most active students but not all the students.

For the **first Cycle** (Cycle 1, Figure 1) a special assessment form with assessment criteria arising from the content of the lessons was designed. It required students to use topic-related vocabulary, and grammar learned during the unit. Students were randomly divided into pairs, they were given assessment forms and question cards. Each pair of students had to listen to each other and assess their speaking. At first, it was hard for students to assess their peer's speaking as most of them found it difficult to digest pronounced sentences and assess. Weaker students could not understand criteria in full or could not assess grammar part because of poor knowledge. But stronger students could assess their peers and comment on their assessment results.

Analyzing the outcomes of the 1st Cycle the following improvements of the peer assessment practice was made:
  – Ensure lower level students have some topic-related vocabulary in question cards
  – Ensure students understand assessment criteria by designing the criteria themselves
  – Give more time to prepare their answers (2 min instead of 1)
  – Put students in pairs of Higher – Average, Average – Lower level

The **second Cycle** (Cycle 2, Figure 1) was applied in 4 meetings; two meetings for teaching learning process, vocabulary and grammar, and designing assessment criteria related to the

learned materials. Students were encouraged to design assessment criteria to understand how and what to assess. Students were also given feedback by the Teacher to learn giving feedback.

Two meetings were designed to do peer speaking and assessment by the criteria as well as meeting time limits. Preparation time was prolonged up to 2 minutes, as weaker students had to prepare for speaking as well as for assessment and giving feedback.

The adjustment of the implementation brought a positive effect. It helped weaker students to gain more confidence in speaking and in giving feedback to their peers. Observations of Cycle 2 revealed the following progress in speaking:
- Students seemed to be more relaxed while speaking to their peers (in contrast to Teacher-student assessment);
- Peer evaluation allowed students to get acquainted with some assessment criteria and the process itself.
- Putting students into pairs with proximately different levels was more effective, as weaker students were able to listen to stronger level students, gain some topic related words and phrases, learn correct pronunciation and more able learners could help to correct their grammar;
- Apart from assessing each other's speaking students learned giving feedback and explaining their assessment. At first it was only Higher level students who could give feedbacks, but by the end of research all students were able to assess their peers' speaking and give detailed feedbacks.

Before treatment (Pre-test) and after each Cycle (Cycle 1 and Cycle 2) of speaking and peer assessment students' results were added up and divided into the number of students to receive the average score. The observed groups of students showed below progress:

Pre-test results – mean score 63
Cycle 1 – mean score 69
Cycle 2 – mean score 75

Based on the research findings the answer to the **Research question 1** if peer assessment was effective in developing EFL students' speaking skills, is positive. In both Cycle 1 and Cycle 2 have shown the gradual growth of mean score for speaking. The peer assessment corrected the students' mistakes and improved their speaking. The benefit of this activity is to enable students to overcome language barrier and gain confidence in speaking as well as to understand assessment criteria and assess their peers speaking. In learning speaking confidence is a pivotal aspect. The peer assessment enables to enhance the students' confidence as well as their motivation. Studies showed some advantages of peer assessment as well as disadvantages.

Advantages of using peer assessment in speaking:
- ✓ Students feel more relaxed while speaking to peers, therefore gain confidence in speaking;
- ✓ Take responsibility for and manage their own learning;
- ✓ Learn to assess and give others constructive feedback, and improve assessment skills;
- ✓ Enhance students learning through knowledge diffusion and exchange ideas;
- ✓ Motivated to engage with course materials more deeply.
- ✓ Become aware of self progress, strengths and weaknesses.

Disadvantages of using peer assessment in speaking:
- ✓ Students will have a tendency to award everyone the same score.
- ✓ Students will not be able to assess their peers due to low language level.
- ✓ Students may be reluctant to make judgements regarding their peers.

Research question 2 "How does peer feedback affect students' speaking performance?"

By raising above issue as a research question peer-assessment is viewed as another way of challenging students' dependence on the teacher for feedback and guidance in their learning. It emphasizes learner autonomy and cooperation. It is based on the assumption that students can learn as much from each other as they can from the teacher (Ashraf & Mahdinezhad, 2015).

The observation of the survey on the process of giving feedback has revealed that giving feedback to peers was mostly effective in pair work between Higher– Average and Average – Lower level students, with the latter sometimes struggling to implement constructive feedback to Higher level students.

Survey Questionnaire Results

Students answered the survey questionnaire to define student's opinions about using peer assessment and peer feedback to improve their speaking:
- 20 of 25 students answered that peer assessment helps to develop their speaking.
- Parts of assessment that were difficult for them: assessing peer's speaking – 14, giving feedback – 11.
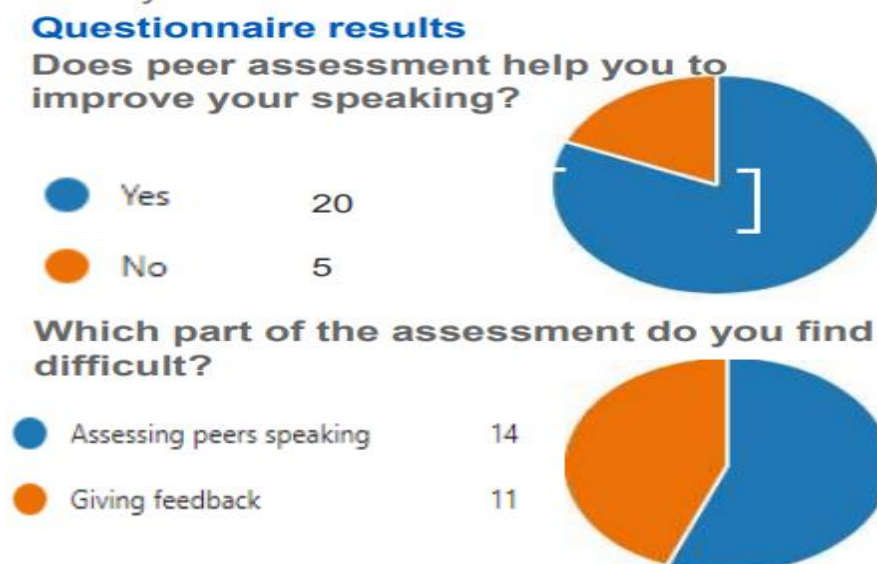
Figure 2: Questionnaire about peer assessment

Based on the results, it can be inferred that the majority of students perceive peer feedback as a valuable tool for their learning and have provided positive responses regarding its usefulness. s per the feedback provided by the students, it appears that they find it equally challenging to assess the speaking of their peers and provide constructive feedback. This task involves a range of complex skills, such as speaking, analyzing errors, and evaluating performance based on predetermined criteria, which require the use of higher-order thinking

abilities. Engaging in such activities may contribute to the development of cognitive and metacognitive skills among students.
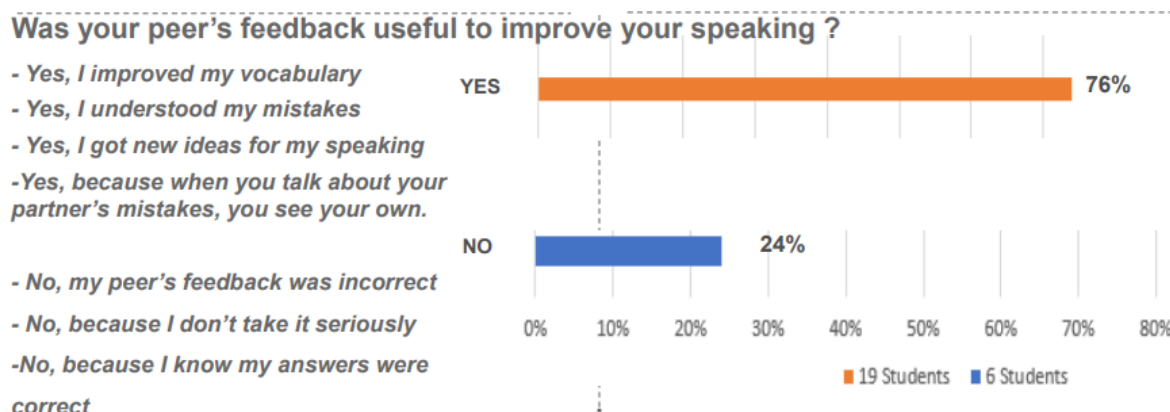

Figure 3: Questionnaire about peer feedback

The students' perception of the impact of peer feedback on their speaking skills was somewhat mixed, with some expressing positive views while others highlighting certain limitations of the peer assessment approach. The feedback provided by students revealed some advantages and drawbacks associated with peer assessment.

As for the answers above, peer assessment helps students to develop their assessment skills and learn to provide constructive feedback to their peers. One of the main advantages is that it promotes students to take responsibility for their own learning, as they have to assess and provide constructive feedback to their peers. This process also enhances their assessment skills and encourages them to engage with the course material on a deeper level. Additionally, knowledge diffusion and the exchange of ideas among students can improve the overall learning experience. Furthermore, peer assessment can raise students' awareness of their own progress, strengths, and weaknesses. However, there are also certain disadvantages of using peer assessment in speaking. For instance, students may have the tendency to rate everyone equally, which can undermine the validity of the assessment. Moreover, students with lower language proficiency may struggle to assess their peers accurately. Consequently, students with higher level of English may remain unsatisfied with their peer's feedback. Finally, some students may be hesitant to provide judgment on their peers or disagree with their assessment, which can negatively impact the effectiveness of the evaluation process.

Conclusion

The evaluation of students' learning progress is a crucial aspect of the educational process. A recent study has revealed that despite its limitations, peer assessment can offer significant benefits to students, such as promoting self-directed learning and motivation. By involving students in the evaluation process, teachers can accurately measure and enhance elements that would have been difficult to achieve otherwise. This approach can also serve as an additional tool for teaching, leveraging students' potential and enthusiasm to improve their performance. Furthermore, the presence of a competitive environment among peers during the assessment may encourage them to engage more actively and be stricter in their evaluations, ultimately leading to more efficient assessment practices. The use of peer assessment also fosters a sense of community among students, as they are invited to participate in an essential aspect of education. Feedback from peers plays a critical role in this type of assessment, allowing teachers to assess individual students with greater accuracy while reducing their workload.

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Writing Conversations: Exploring How Metalinguistic Understanding Fosters Young ESL Learners' Writing in Classrooms

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Abstract

The purpose of this article has two main objectives: firstly, to investigate and identify the syntactic structures employed by young ESL writers in their compositions; and secondly, to explore how ESL writers' metalinguistic understanding of syntactical construction affect their writing. The study involved the analysis of essays from 92 ESL secondary students of advanced and intermediate proficiency levels. A manual linguistic analysis was conducted, utilizing a coding framework that assessed various syntactic complexity features at the sentence, clause, and phrase levels. The second set of data was obtained from semi-structured interviews and elicitation task with 12 students, chosen from the corpus sample. The results revealed a consistent pattern among advanced writers, characterized by a higher frequency of relative clauses, finite subordinate clauses, prepositional phrases, coordinate phrases, and adverbials as sentence openers. Despite inferential statistics suggesting a potential developmental pattern, a detailed examination of students' essays indicated that conceptualizing and measuring syntactic complexity solely based on the presence of specific syntactic features might be insufficient. The in-depth analysis showed that certain features, such as minor sentences, could not be adequately captured using the syntactic complexity measures employed in many prior studies. Additionally, the elicitation tasks also revealed that students' metalinguistic understanding of syntactical construction does affect their writing, which suggest explicit teaching of syntactical constructions and varied sentence structures could enable more effective written communication.

Keywords: Syntactic Complexity, Metalinguistic Understanding, Second Language Writing, Linguistic Development

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Introduction

Writing skills are crucial for academic success, employment, and effective communication. However, many second language learners, especially in Malaysia, continue to struggle with writing. Sentence construction plays a vital role in facilitating higher-order writing skills such as planning, editing, and revising impacting the effective translation of ideas (Graham, 2006). Previous research by second language scholars has aimed to address these issues by examining the essays of second language learners, particularly focusing on university students in Malaysia and identifying common errors in their writing (Abdul et al., 2004; Yasruddin et al., 2010; Mukundan, J. & Khojasteh, L., 2011; Mukundan, J. et al., 2013).

Despite the recent surge in interest in syntactic complexity in second language writing, many studies have presented mixed and inconsistent results (cf. Robinson 2007; Skehan 2009; Spada & Tomita 2010). Additionally, corpus linguistics studies investigating syntactic complexity in writing have typically reported results solely based on the presence of syntactic features. This paper contends that a systematic exploration of syntactic complexity is essential to uncover how writers of different proficiency levels employ these features to shape and modify their sentences, ultimately enhancing the effectiveness of their written communication. Furthermore, this study also looks at second language learners' metalinguistic understanding to investigate its relationship with students' syntactic constructions in writing.

Syntactic Complexity and Writing Quality

Numerous studies have explored the correlation between syntactic complexity and writing quality. These investigations were predicated on the belief that syntactic features play a pivotal role in assessing linguistic development, as more intricate syntactic structures are often associated with higher evaluations of writing quality (Crossley & McNamara, 2014). However, prior research has reported inconsistent results, with no comprehensive explanation provided for this variability. For instance, Crossley and McNamara (2014) examined the connection between syntactic complexity indices measuring second language (L2) development and human ratings in L2 writing. They found that essays featuring "a greater number of complex syntactic structures, including syntactic structures related to clause complexity ('that' clauses and 'to' clauses)," received higher ratings (Crossley & McNamara, 2014, p.75). Conversely, Biber (2006) and Biber et al. (2011) argued that dependent clauses are more characteristic of speech than academic writing. In another study by Bulté and Housen (2014), the *Language Use* scores from raters correlated with various syntactic complexity measures, including mean length of sentence, mean length of T-unit, mean length of noun phrase, subclause ratio, simple sentence ratio, complex sentence ratio, and compound-complex sentence ratio. Although these measures showed correlation with overall writing scores, not all were indicative of developmental sensitivity. For instance, the complex sentence ratio, used to measure subordination, significantly correlated with essay quality but did not signify developmental progression.

A review of syntactic complexity studies by Crowhurst (1983) concluded that the two most commonly used syntactic complexity measures, T-unit length and clause length, do not consistently relate positively to writing quality. Crowhurst argued that increased T-unit length can sometimes be associated with flawed writing, and the writing mode may influence the relationship between T-unit and quality. Importantly, Crowhurst (1983) emphasized that enhancements in writing quality should not solely rely on syntactic complexity scores; other

factors surrounding the writers must also be considered. Consequently, the idea that the presence of syntactic features unequivocally determines linguistic development and writing quality should be approached with appropriate caution.

Metalinguistic Understanding in Writing Classrooms

The debate surrounding the effectiveness of grammar instruction in second and foreign language pedagogy has persisted for over a decade. Early studies in Second Language Acquisition by Kessler and Idar (1977), Fabris (1978), and Krashen (1987) suggested a natural order and sequence in learners' acquisition of grammatical structures. According to this theory, the acquisition of grammatical structures progresses in an expected manner (Krashen, 1982). Scholars such as Krashen (1981) and Schwartz (1993) have argued that explicit knowledge of language is not advantageous for learners' acquisition (Ellis, 2008). This ongoing debate has prompted researchers to explore the effectiveness of various language instruction methods in second language learning, including form-focused instruction.

Long (1991) defined focus on form as the instruction which draws students' attention to linguistic elements as they arise incidentally in lessons whose overriding focus is on meaning or communication. However, Ellis (2001) pointed out potential issues with Long's (1991) definition, noting that previous research using it tended to overlook the second defining characteristic of focus on form – its incidental nature. According to Ellis (2001), form-focused instruction differs from meaning-making instruction by its primary focus on form and intensive treatment of preselected forms, requiring learners to concentrate intensely on specific forms for learning. Many second language researchers argue that form-focused instruction is an effective method in second language learning (Norris and Ortega, 2000), with Ellis (2008) supporting the idea that it enables learners to progress more rapidly along the natural order.

The teaching of writing in Malaysian classrooms, as observed by Lim (2014), has been noted to be form-focused, with grammar and writing often taught separately. While previous research has shown positive outcomes from explicitly teaching grammar knowledge to learners (Hammond, 2012; Moore and Schleppegrell, 2014), it is also essential for learners "to be able to think grammatically about language choices in writing" (Chen and Myhill, 2016, p. 101). This concept goes beyond viewing grammar as solely rules and compliance (Becker, 2006). Writing instruction in second language classrooms should emphasize not only explicit grammar knowledge but also the conscious awareness of language in shaping writing (Chen and Myhill, 2016, p. 101). In other words, teachers should guide students to move beyond "an abstract knowledge about language to apply that knowledge to their writing" (Chen and Myhill, 2016, p. 101). While this concept is relatively new in the Malaysian context, its introduction could significantly contribute to learners' writing development.

Methodology

The procedures for data collection were conducted simultaneously but separately, and the two data sets underwent separate and independent analyses. Corpus data were analyzed using statistical analysis, percentages, comparisons, and descriptive statistics. In contrast, interview and writing conversation data were analyzed by identifying patterns and conducting thematic analysis. The results from both data sets were subsequently organized thematically and

presented. The two datasets were combined to formulate a conclusive interpretation. The merged data is then presented, explaining how the diverse data types contribute to a more comprehensive understanding in the current study.

The Sample

Participants were assigned two essay prompts, with an effort made to ensure an equal distribution of argumentative and narrative essays. Half of the class received an argumentative task, while the other half received a narrative task. The requirement for the essays was a minimum of 350 words, and participants had one hour to complete the task. To maintain the reliability of the study, participants and teachers were not informed of the writing topics in advance to prevent students from planning their writing ahead of time, which could potentially impact the essays and, consequently, the findings. However, the topics or prompts provided were modeled after those found in the 1119 paper of the Malaysian Certificate of Education examination, as well as other Form four writing textbooks or exercise books, making them familiar to students and teachers. Out of 120 essays, only those that were complete and comprehensible were selected for inclusion in the research, resulting in a total of 92 essays.

	Essay Genre	
Proficiency Level	Argumentative	Narrative
Advanced	23	23
Intermediate	23	23

N= 92

Table 1: Essay samples in the study

General Complexity	Clausal Complexity	Coordination	Phrasal Complexity	Frequency of Clause Patterns
Mean length of sentence	Mean length of clause	Frequency of Coordinate Clause	Frequency of Adjectival Prepositional Phrase	SV
Clauses per sentence	Frequency of Relative Clause	Frequency of Coordinate Phrase	Frequency of Appositive Noun Phrase	SVO
	Frequency of ING-clause		Frequency of Adverbial Prepositional Phrase	SVC
	Frequency of ED-clause			SVA
	Frequency of TO-clause			SVOC
	Frequency of Finite Subordinate Clause			SVOO
				SVOA
				SVCA
				AVS
				ASVA

Table 2: Syntactic complexity measures employed in the present study

In the second phase of data collection, writing conversations were carried out with 12 selected student participants from the writing sample. This writing conversations were conducted to address how students' metalinguistic understanding of syntactical structure affects their writing. The writing conversation, resembling a semi-structured interview, combines questions designed to extract perceptions and beliefs regarding writing and essay grading with tasks aimed at eliciting a metalinguistic understanding from students. The 12 student representatives for these writing conversations were chosen based on their proficiency levels, categorized as intermediate and advanced, determined by their English language results in the Lower Secondary Assessment or PT3—a public examination for Form three students in Malaysia. The selection process also considered the syntactic structures used in the chosen essays, ensuring they could serve as prompts during the writing conversation. The chosen essays exhibited specific syntactic features that were intended to be discussed in the elicitation task.

Discussion

The results obtained from the linguistic analysis of students' essays, categorized by proficiency level and genres, demonstrate distinct syntactical patterns. Proficient writers exhibit enhanced control over their sentence structures, evident in the increased frequency of relative clauses, finite subordinate clauses, adjectival and adverbial prepositional clauses, as well as adverbial sentence openings observed in advanced essays. Advanced writers display confidence in using these syntactic features to achieve various rhetorical effects in their writing, such as amusing, shocking, persuading, or prompting readers. This is considered a marker of more skilled writers, as it involves conscious decision-making to enhance writing effectiveness.

Intermediate writers, on the other hand, favor compound sentences linked by coordinate conjunctions (primarily 'and,' 'but,' and 'so'), emphasizing content delivery over the consideration of rhetorical effects achievable through more complex syntactical features. Notably, the increased use of adverbials as sentence openings among advanced writers demonstrates their ability to manipulate sentence structures for diverse effects, employing short or minor sentences strategically. This proficiency allows them to use adverbials to initiate sentences, focusing on different ideas to communicate their messages more effectively. While intermediate writers also utilize adverbials at the sentence beginning, these are mostly linking adverbs, and their overuse is highlighted in the qualitative analysis, potentially diminishing the effectiveness of their essays. This underscores the significance of manual linguistic analysis and emphasizes that relying solely on numerical occurrences for complexity assessment may yield misleading findings, as complexity alone does not guarantee quality or effectiveness.

	Proficiency Level	N	Mean	Std. Deviation	Independent T-test P value
Clause Length	Advanced	46	9.13	2.42	0.088
	Intermediate	46	8.41	1.44	
Relative Clause	Advanced	46	4.72	3.17	0.000*
	Intermediate	46	2.02	1.57	
ING-clause	Advanced	46	0.11	0.58	0.150
	Intermediate	46	0.02	0.15	
ED-clause	Advanced	46	0.11	0.48	0.133
	Intermediate	46	0.00	0.00	
TO-clause	Advanced	46	0.65	0.90	0.127
	Intermediate	46	0.39	0.71	
Finite Subordinate Clause (with connective conjunction)	Advanced	46	15.17	4.43	0.047*
	Intermediate	46	13.17	5.06	

*Note. *indicates that the difference between these two groups have a statistical significance*

Table 3: Clausal complexity of Advanced and Intermediate learners

	Proficiency Level	N	Mean	Std. Deviation	Independent T-test P value
SV	Advanced	46	0.52	1.03	0.077
	Intermediate	46	0.22	0.51	
SVO	Advanced	46	4.61	1.60	0.001*
	Intermediate	46	6.13	2.46	
SVC	Advanced	46	5.91	2.06	0.764
	Intermediate	46	5.76	2.74	
SVA	Advanced	46	6.02	1.42	0.069
	Intermediate	46	6.61	1.62	
SVOC	Advanced	46	3.91	1.64	0.192
	Intermediate	46	4.41	1.98	
SVOO	Advanced	46	3.07	1.50	0.000*
	Intermediate	46	4.87	2.36	
SVOA	Advanced	46	5.30	2.04	0.001*
	Intermediate	46	3.93	1.87	
SVCA	Advanced	46	2.96	1.25	0.516
	Intermediate	46	3.13	1.31	
AVS	Advanced	46	0.52	0.84	0.015*
	Intermediate	46	0.17	0.44	
ASVA	Advanced	46	1.98	1.47	0.084
	Intermediate	46	1.32	1.06	
ASV	Advanced	46	1.47	1.70	0.048*
	Intermediate	46	0.80	0.65	
ASVO	Advanced	46	2.31	1.04	0.104
	Intermediate	46	1.81	1.37	

*Note. *indicates that the difference between these two groups have a statistical significance*

Table 4: Syntactic constructions of Advanced and Intermediate learners

Furthermore, the findings indicate that argumentative essays exhibit higher mean sentence length, sentence complexity, mean clause length, coordinate phrases, and adjectival prepositional phrases. These features are likely influenced by the academic nature of argumentative essays, reflecting characteristics commonly found in academic writing. Additionally, the use of more post-modifiers in managing arguments and depicting cause-effect relationships contributes to these results. Interestingly, although argumentative essays are generally more complex than narratives, they display fewer adverbials as sentence openings. The prevalence of short or minor sentences in narratives may afford writers more opportunities to use adverbials at the sentence beginning. Writers may also feel more confident starting sentences with the typical subject-verb structure, as it facilitates argument management and presentation. This specific finding suggests that the syntactic variation in sentence openings could benefit from further exploration, particularly in diverse genres.

In addition, the study has also generated comprehensive interview data about students' metalinguistic understanding and their perceptions of what is important in essay writing. The results can be discussed in several evident themes.

Significance Lack of Confidence

Primarily, there was a noticeable lack of understanding in sentence syntax, extending beyond the basic subject and verb components to encompass clauses, phrases, and sentence variety. This inadequacy was evident in students' performance during the elicitation task, where most struggled and expressed low confidence in task completion. If they possessed a more comprehensive knowledge of sentence syntax, clauses, phrases, and sentence variety, their performance could have been improved. Increased metalinguistic comprehension of these elements might have empowered students to employ grammatical reasoning, thereby enhancing their ability to correctly respond to the task.

Misconceptions

Misconceptions among students regarding syntactic elements were further exacerbated by the lack of metalinguistic understanding. When tackling elicitation tasks, students struggled to employ grammatical reasoning and instead, relied on 'proxies' to decipher sentence structure. Misconceptions, such as viewing phrases as shorter than clauses, equating simple sentences with short sentences, and perceiving clauses as incomplete sentences requiring additional words, were among the various misconceptions causing difficulties for students.

The Importance of the Teacher, Exams and the Teaching of Writing

Students consistently emphasized the significance of adhering to teachers' guidance regarding exam priorities. This underscores their strong dependence on teachers, and the comments imply that teachers might be overly instructive. There is minimal indication that students are cultivating independence and authorship skills in English, which could pose challenges later on, especially in higher education where students are expected to be self-reliant learners.

Students' feedback indicates that the teaching of writing primarily emphasizes accuracy without giving due attention to communicative effectiveness. The instructional method employed by teachers, involving cloze passages and error analysis, is heavily focused on form rather than adopting a functionally-informed approach to grammar. While this approach may enhance the precision of students' essays, it may not contribute significantly to their

ability to effectively communicate ideas through writing. Interestingly, students seem to accept this form-focused approach, potentially influenced by the exam-oriented education system. It is noteworthy that the rubric emphasizes sentence variety without commensurate attention to it.

Ultimately, the teaching approach adopted by teachers appears to result in students prioritizing good grades over developing strong writing skills. Throughout the interviews with all students, the frequent use of the word 'memorize' to describe their learning approach is surprising. This suggests a preference for a spoon-fed learning style, potentially driven by the pursuit of good grades. Notably, none of the students expressed concern about how effectively they could convey their messages through their writing.

Conclusion

The results discussed in the study have uncovered information that could be valuable for various stakeholders in the field of education and linguistics. Developers of curriculum and educational materials can utilize these findings as guidelines when creating textbooks, modules, lectures, and other materials for L2 classrooms, particularly in the context of writing lessons. Moreover, the study underscores the significance of metalinguistic understanding in the teaching and learning of writing, potentially challenging the rigid concept of form-focused pedagogy in Malaysian classrooms. The outcomes of this research are also beneficial for educators, parents, students, and future researchers, offering insights into the current state of writing competence among Malaysian learners and shedding light on potential reasons behind writing challenges faced by these second language learners.

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Code-Switching in Mathematics Teaching in Early Childhood Education: Switching From English to the Home Language

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Abstract

In communication and linguistics, code-switching (CS) refers to the process of using two or more languages in speech. South Africa is a multi-lingual and multi-racial society. Schools form part of societies, therefore it is to be expected that this 'multi-ness' will also be evident in schools. In many South African schools, children are taught two languages namely their 1Home Language (HL) and a Second Language (SL). Education policy proposes that subjects in *primary schools* be taught in the school's *Language of Learning and Teaching* (LOLT), which is often English. However, teachers often code-switch between the LOLT and their 2mother tongue. This article examines the disadvantages and benefits of CS in the teaching of Mathematics in South African primary schools. Interviews were conducted with thirty-five teachers and seventy-eight learners from primary schools that have English as a LOLT, but where most teachers and learners have *Sesotho* as a HL. The findings revealed that teachers generally code-switch because they express themselves better in Sesotho, and they believe that learners will understand Mathematics better if some concepts are explained in Sesotho. The majority of the Sesotho-speaking learners reported that they appreciate it when the teachers explain Mathematics in English and Sesotho. However, learners who do not speak Sesotho claimed that they feel lost when teachers 'teach' Mathematics in Sesotho. The study concluded that CS is beneficial for teachers and for some learners, but teachers need to be cognisant of the fact that there are learners in their classes who do not speak and understand Sesotho.

Keywords: Code-Switching, Mathematics, Language of Learning and Teaching, Second Language, Home Language, Sesotho

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Introduction

South Africa, like many other countries, is a multi-lingual, multi-cultural and multi-racial country (Phatudi, 2015; Evans, 2015; Melysa, Sinambela & Pasaribu, 2022). South Africa has eleven official languages that are all recognised in the Constitution of South Africa of 1996. Despite this language diversity, English is a dominant language in many sectors of South Africa such as schools and businesses. English serves as a connecting thread among people of different linguistic backgrounds. The language diversity is not reflected in many schools and the language policy in schools is complex. Although the *Department of Basic Education* (DBE) is in favour of mother tongue instruction, especially in the *Foundation Phase* (Grades R-3), many primary schools have adopted English as the LOLT. In many of these schools, the learners' and teachers' mother tongue is not English. Rather, in most cases English is their SL. The focus on English as the LOLT poses many challenges for such schools. In the Foundation Phase learners are taught four compulsory subjects namely Mathematics, Life Skills, a HL (which can be English or any one of the official languages) and a SL. In schools where the LOLT is English, Mathematics and Life Skills have to be taught in English, whether or not English is the teachers' and learners' HL. This translates to the fact that many learners are being taught in a language that is not their mother tongue. In addition, many teachers have to teach in English, although they have English as a SL. The semantic, grammatical, morphological and syntactic structures for many languages are unique and learners and teachers whose HL is different from the LOLT are disadvantaged because they have to try and decipher subject content as well as English (Schoonen, 2015). This is because these learners' and teachers' English proficiency is lower than those who have English as a HL. The result is that many teachers use CS as one of the mechanisms to transfer content knowledge to learners. This study investigated the reasons why teachers code-switch, their attitudes towards CS and the advantages and disadvantages of using CS in the teaching of Mathematics.

Problem Statement

Globally many people are bilingual or multi-lingual. Schools are part of societies and therefore many schools are bilingual or multi-lingual. South Africa is a multi-lingual country but English is often used as the communal language in academia, business, schools, politics and social conversations (Van der Walt, Evans & Kilfoil, 2009). Many schools in South Africa have English as a LOLT, although the teachers and learners have a language other than English as a HL. In an English-limited context, many learners and teachers come from a background where they speak a language other than English at home. Although teachers can communicate and teach in English, many are not proficient in the language. The same applies to learners - many of them know English but are not proficient. The challenge is thus that teachers have to teach Mathematics in a language in which they are not proficient. In addition to this challenge is the fact that learners whose HL is not Sesotho, cannot understand Mathematics when the teachers code-switch from English to Sesotho.

Aim of the Study

Mathematics is regarded by many people as a difficult subject with complex terminology. Many learners struggle with inadequate mathematical skills which is often caused by challenges in grasping fundamental mathematical and numerical concepts. Learners who are taught Mathematics in a language that is not their mother tongue not only have to battle with difficult concepts but also have the added challenge of being taught in a language in which

they are not proficient. Unfortunately, teachers have to teach a complex subject in a language that is not their mother tongue. In order to address these challenges, many teachers opt to code-switch when they teach Mathematics. The study aimed to investigate:

(i) the positive and negative factors of CS in the teaching of Mathematics;
(ii) teachers' and learners' attitudes towards CS.

Motivation for the Study

Mathematics is a critical subject that forms the foundation of various disciplines. It is a basic skill that is used and needed in our everyday lives. It is long-standing knowledge that Foundation Phase learners in South Africa perform at a poorer level in Mathematics compared to their counterparts in other countries. One reason for this poor performance is the language barrier experienced by teachers and learners in many South African schools (Naude, 2017; Meier, 2019). The study was motivated by two factors: a) the manner (tell and listen) in which Mathematics is often taught in the Foundation Phase and b) the disadvantages of CS experienced by learners whose HL is not Sesotho. The researcher observed these factors when she visited the schools to evaluate students during teaching practice. Also, the researcher was a teacher for many years and observed the phenomenon of classroom CS.

Significance of the Study

Learners who are not proficient in the LOLT and in Sesotho, or those with a low proficiency, have a language deficit or barrier (Meier, 2019). They lack Cognitive Academic Language Proficiency (CALP), which is the proficiency needed to understand academic concepts and to perform the higher cognitive operations necessary to flourish in school. There are several reasons why the study is significant:

- The study hopes to assist teachers in adapting their classroom practices to meet the needs of learners who are learning through a SL.
- To provide possible solutions for the language challenges faced by minority group learners (those learners who speak languages other than Sesotho at home).
- To create awareness of the positive and negative implications of CS in the Mathematics classroom.

Theoretical Framework

The theoretical framework that underpins the study is Holmes's (1992) theory of CS, which occurs when speakers shift their speech from one language to another in verbal communication.

Literature Review

a) What is Code-Switching?

In bilingual and multi-lingual classrooms worldwide, CS is a frequent practice (Fachriyah, 2017; Abdulloh & Usman, 2021). Different definitions are suggested for CS by researchers. Generally, CS is regarded as the use of two language varieties in the same conversation. Mazur, Karolczak, Rzepka & Akari (2016: p. 55) define it as 'a phenomenon that exists in many multilingual societies where people use more than one language to communicate on a daily basis, such as Singapore, the Philippines, India, the USA, Spain and China". CS relates to switches between sentences in two different languages spoken by bilinguals or multi-

linguals. CS is when an individual who is bilingual alternates between two languages during his/her speech with another bilingual person. It is more than alternately using two languages because the communication that people hold is an interactional unit that embraces a two-way discourse. Often CS is used synonymously with code-mixing and code-changing. Such socio-linguistic phenomena can occur at two levels: a) the lexical level, when there is no instant equivalent for a word or sentence in the HL b) the semantic level, where an idea or a concept is better explained in the language currently spoken by a bilingual in a given language situation (Munoz & Fernanda, 2006; Hasan & Akhand, 2015; Almelhi, 2020).

b) Types of Code-Switching

There are mainly three types of CS namely inter-sentential CS, intra-sentential CS and tag CS.

(i) Inter-sentential CS: this type of CS takes place at the sentence level, where a speaker utters a sentence fully in one language or another (Almelhi, 2020).

E.g. Teacher: Is Jacob not at school today? *Ke kopa lenkarabe hle.* (English and Sesotho) (Please answer me). In this scenario the teacher speaks English but also inserts a full sentence in Sesotho.

(ii) Intra-sentential CS: these switches take place when a speaker inserts a word or words from their HL (or SL) in a sentence because they do not know, or have forgotten a word:

E.g. *Ke tlo tla le calculator hosane.* (Sesotho and English). The speaker speaks Sesotho but inserts an English word, calculator, in the sentence. I will bring the calculator tomorrow.

(iii) Tag CS: this type of CS typically includes the insertion of a tag or short expression in a sentence:

E.g. *O na le teng*, you know. (Sesotho mixed with English) He was there, you know.

c) Functions of Code-Switching

CS has a variety of functions which vary according to the topic, people involved in the conversation, and the context of the conversation. Below are some of the reasons why people usually code-switch:
- To emphasise a point.
- To substitute a word for an unknown word (or a word the speaker does not remember).
- To express a concept that has no equivalent in the 'switch-from' language.
- To clarify a point.
- To ease tension and inject humour into the conversation.
- To relay meaning more accurately.
- Quoting what someone else has said.
- Habitual experiences.
- When bilingual speakers want to convey their attitudes or emotions to each other.

- In situational CS such as in the classroom teachers usually code-switch to narrow the language gap between them and their learners.
- When there is no appropriate translation for the language used (Hasan & Akhand, 2015; Almelhi, 2020).

d) Advantages and Disadvantages of Classroom Code-Switching

The use of CS in the classroom is an issue of great importance for educators and learners because it is a resource that teachers and learners may use in order to achieve a specific communication goal**.** However, the use of classroom CS is a debatable issue in current education practices because there are two views on the phenomenon. The first view is from researchers who consider CS as conflictive, especially for learners who do not understand the language the teachers switch to. The second view is from those researchers who see it as positive in the classroom (Munoz & Fernanda, 2006; Shinga & Pillay, 2021). CS has negative implications for some learners. A major disadvantage of CS is that learners who do not speak the *'switch-to' language* feel lost. CS may thus create problems in the classroom because students who do not speak the 'switch-to' language may feel neglected and marginalised. It is a positive for learners who speak the 'switch-to' language because it helps maximise learning opportunities in a bilingual/multi-lingual classroom. It is a linguistic advantage rather than an obstacle for these learners.

Method

a) Data Collection Instrument

A qualitative research approach in the form of interviews was used to collect data. Open-ended questions were mostly asked. The interviews were conducted by the researcher herself over a period of five months. Purposive convenience sampling was adopted because the participants were easily reachable and willing to take part in the study. The interviews with the teachers were conducted in English. The interviews with the learners were conducted in English, Sesotho, *Xhosa*, and *Afrikaans*, depending on the learners' HL.

b) Sample

Focus group interviews were conducted with thirty-five teachers and seventy- eight learners during a period of four months. The learners and teachers were selected from seven primary schools in *Bloemfontein.*

	35 Teachers	**78 Learners (2 groups)**
	Foundation Phase teachers	Learners from Grades R-3
	Have Sesotho as their HL	Group A - 62 learners - Have Sesotho as their HL Group B - 16 learners - Speak other Home Languages (Afrikaans, Xhosa, *Zulu, Venda*). - These learners have a very limited or no understanding of Sesotho.
	Have English as their SL	
	26 were female, 9 were male	

Table 1: Profile of the participants

Findings and Discussion

Interactional analysis was used to analyse the data. Interactional analysis is one of the methods of narrative research. Narrative analysis is a method that focuses on interpreting human experiences and motivations by looking closely at the narratives of the participants. It is a branch of interpretive research where 'words do the work'. Narrative research is an attempt to increase understanding of central issues related to teaching and learning through the telling and retelling of participants' stories (Van Wyk and Taole, 2015).

Below is an extract of the interviews that I conducted with teachers and learners.

Interviews with teachers	Interviews with learners
Are you aware that you code-switch during Mathematics teaching? P1: *"Yes I'm aware. I use English mostly, but sometimes I put in Sesotho words".* Why do you use Sesotho and English? P2: *"Most of the time is when I see the children do not understand. Or sometimes they ask me to explain in Sesotho because they do not understand the English explanation. Sometimes I have to explain the English words in Sesotho. Sometimes I explain in Sesotho because it's my Home Language. So I think it's beneficial for me and the learners to translate to Sesotho".* Are there children in your class that do not have Sesotho as a Home Language? P3: *"I'm not sure. But I think maybe one or two do not speak Sesotho, out of 38 learners".* Do you think that those one or two learners understand the content if you use Sesotho also? P4: *"I never really thought about it. Now that I think about it. yes, I think it's a barrier. Shame. I wish I could code-switch and explain in their languages. And some of them are not very good in English. So, it would help a lot if the content could be explained in their languages. But who is going to do it? Maybe the parents can. There is one teacher at my school who speaks isiXhosa, but she teaches the intermediate phase".*	What is your favourite subject? P5: *"I like Maths".* Which part of Maths do you like? P6: *"Addition/ volume/...But I don't like long division and long multiplication. Those are so hard".* Would it help if the teachers explained Maths in your Home Language? P7: *"Yes, I think so. Because the teachers explain to Sesotho learners. And when he speaks Sesotho, I don't understand. I only understand a little Sesotho".* What language do you speak at home? P8: *"Xhosa, but sometimes English".* <u>Who helps you with homework?</u> P9: *"My sister"* P10: *"My mom"* P11: *"No one. I do it myself. My parents work late".*

Table 2: Extract of interviews

The findings from the interviews reveal the language challenges experienced by learners and teachers in South African schools, especially in the teaching and learning of Mathematics. Teachers state that they code-switch mainly to clarify content and terminology. Teachers do not seem to be aware that there are learners in their classes who do not understand Sesotho. The teachers who are vaguely aware that there are non-Sesotho speakers still continue to code-switch to Sesotho. Teachers feel that these learners are in the minority and that the majority should be catered for. Many of the learners who are non-Sesotho speakers reported that it is hard for them to comprehend Mathematics - even more so when the teachers code-switch to Sesotho. Some said they are scared to tell the teachers that they do not speak

Sesotho. The learners who speak Sesotho reported that they appreciate it when teachers explain content in Sesotho and English.

Conclusion and Recommendations

The extent to which a learner is proficient and competent in the mother tongue will to a great extent determine his/her academic performance. Learning in a language that is not one's mother tongue is usually an overwhelming and frightening experience. The article aimed to highlight the benefits and disadvantages of CS. From the interviews it can be extrapolated that learners and teachers acknowledge the importance of CS. However, CS from English to Sesotho benefits the learners who can speak Sesotho, it serves no purpose for non-Sesotho speakers. Non-Sesotho learners' academic performance is thus hampered. CS is a normal, natural and useful response in a bilingual classroom and is recommended due to its numerous benefits for teachers and learners. But it is only useful and beneficial for learners who understand both languages (the 'switch-to' and *'switch-from' languages*). It leads to language loss for non-Sesotho speakers. The minority of learners who do not speak Sesotho also need to be taken into consideration. Teachers need to establish when the school year starts if there are non-Sesotho speaking learners in their classrooms. If possible, teachers can offer extra classes to these learners to explain Mathematics. Schoonen (2015) recommends that teachers can use gestures, pictures, demonstrations and bilingual software programmes for the non-Sesotho speaking learners. Non-Sesotho speaking learners can benefit from having bilingual dictionaries, e.g. English-Xhosa. Teachers can ask bilingual learners to explain or code-switch terms for learners who speak other mother tongue languages (provided the learners who speak Sesotho can also speak other languages, e.g. Zulu).

Future Directions

Current literature mostly focuses on CS in bilingual classrooms, with the assumption that all learners speak the HL and the SL. Limited literature is reported on the pedagogical implications of CS for learners who do not speak the mother tongue that is spoken by the teacher and the majority of learners. The phenomenon of CS needs to be further explored, especially the effect it has for minority learners in a classroom where they do not speak the 'switch-to' language.

Clarification of Terms

Primary Schools	Schools for children between the ages of about five and eleven.
Language of Learning and Teaching	The language that is used to teach subjects in a school and is used for communication purposes. In this article the Language of Learning and Teaching is English.
Sesotho	One of the official languages that is spoken in South Africa. It is one of the dominant languages spoken in the province where the research was conducted.
Department of Basic Education	It is the local authority that is concerned with education. It develops, maintains and supports the South African school education system.
Foundation Phase	It is the first phase of formal schooling and comprises Grades R-3. Children enrol for Grade R when they are about five years old.
Switch-to language	In this study the 'switch-to' language is Sesotho.
Xhosa	One of the official languages spoken in South Africa.
Afrikaans	One of the official languages spoken in South Africa.
Bloemfontein	The city where the sample schools are and where the research was conducted.
Zulu	One of the official languages spoken in South Africa.
Venda	One of the official languages spoken in South Africa.
Switch-from language	The language teachers switch from when they CS. In this article the 'switch-from' language is English.

List of Abbreviations

CALP	-	Cognitive Academic Language Proficiency
CS	-	Code-switching
DBE	-	Department of Basic Education
HL	-	Home Language
LOLT	-	Language of Learning and Teaching
SL	-	Second Language

Note

1 and 2: In this article Home Language and mother tongue are used interchangeably.

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Pursuing a Career in Logistics: Study Choice Motives and Career Expectations

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Abstract
Major trends, such as digitalization and sustainability, are shaping the future of logistics. As a consequence, qualifications required in the professional field will significantly change, and the demand for logistics professionals with a graduate degree will generally increase. At the same time, the industry has to cope with a skills shortage. A sufficient number of well-educated logistics specialists is essential to master future challenges in the logistics industry. An understanding of the motives for choosing a logistics degree program is an essential basis for effective actions to promote studies and careers in logistics. Therefore, in this work, we explore logistics students' study choice motives. Based on the results, implications for the logistics industry, higher education institutions, and other relevant stakeholders are discussed. An existing model has been adapted to the specific situation of logistics programs at universities of applied sciences. On this basis, a survey among students of a bachelor and a master program in logistics was carried out at an Austrian university of applied sciences. Findings suggest that understanding study choice motives is a multidimensional problem that requires considering a wide range of motives. In conclusion, the motives identified by this work provide a starting point for designing measures to arouse interest in logistics.

Keywords: Career in Logistics, Study Choice Motives, Decision-Making Model

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1. Introduction

The logistics field, probably more than almost any other industry, is being strongly transformed by the megatrends of digitalization and sustainability (DHL, 2022). Long-term success in logistics means making the best out of the opportunities offered by the so-called twin transition (World Economic Forum, 2022), i.e., not only achieving economic goals in the most effective way possible, but also meeting ecological and social challenges by utilizing technology and data. These changes require appropriate adjustments in employees' skills and competences at all levels of qualification (McKinnon et al., 2017). Therefore, the logistics and supply chain industry need well-educated people who are ready for these challenges.

To provide the logistics industry well-trained people, schools and universities play an important role to arouse interest in logistics and teach the skills that students of logistics will need for their careers (Eitler & Schodl, 2019). This is particularly important, as the logistics sector is already suffering from a severe skills shortage (Puls, 2018; BVL, 2017). The shortage of skilled applicants might be due to the negative perception of career opportunities and occupations in logistics, as well as the labor force's demographic structure. Less attractive remuneration and working conditions compared to other sectors may have also contributed to the shortfall (Logistics UK, 2021). A major challenge for the logistics industry is its image. The perceived lack of opportunity for career growth and the perceived low status of professions in logistics negatively affect talent acquisition and retention. Although many tasks are still carried out manually, there is intense ongoing discussion about the application of digitization and automation in the logistics industry to alleviate the skills shortage (Ittermann & Eisenmann, 2019). Nevertheless, people will remain the focus of attention in transport and logistics in the future, and companies and educational institutions need to work on strategies to address the challenges in the labor market.

For higher education institutions (HEIs), it is of particular interest to find out why students decide to study logistics. There are several reasons it is important to understand how students make their study choice decisions:
- Identifying the motives for choosing a certain degree program allows stakeholders to identify the underlying reasons for low student enrollment.
- Knowing the factors influencing study choice allows recruitment activities to be improved and campaigns designed appropriately.
- Knowing young students' expectations allows the curriculum to be tailored not only to the requirements of the labor market but also to students' expectations and needs. This could increase satisfaction with the choice of degree program and lead to more positive word-of-mouth advertising.

Research is sparse concerning logistics students' study choice motives and students at universities of applied sciences (UASs), who are assigned different study choice motives than students at universities (Oberrauch et al., 2021). Therefore, the objectives of this paper are twofold: to explore the study choice motives and career expectations of logistics students at UASs and to propose measures for the logistics industry, tertiary institutions, and politics to encourage more young people to pursue a career in logistics.

The remainder of the paper is structured as follows. Section 2 presents a general overview of study choice motives, followed by an explanation of the methodology in Section 3. Section 4 discusses some empirical results. Section 5 concludes.

2. Study Choice Motives

Following general motivation theories, study choice motives can be divided into intrinsic, extrinsic, and altruistic motives (Heublein et al., 2017). Intrinsic motivation "is defined as the doing of an activity for its inherent satisfactions" (Ryan & Deci, 2000), e.g., studying a subject because it genuinely interests and excites. Most of the activities people do are not intrinsically but extrinsically motivated (Ryan & Deci, 2000). Extrinsic motivation involves "behaviors done for reasons other than their inherent satisfactions" (Ryan & Deci, 2020), e.g., studying hard to get good grades and receive praise or approval from parents or teachers. Altruistic motivation (Bar-Tal, 1985) is centered around the desire to contribute to others' well-being without expecting personal gain or external rewards. Nevertheless, it is not individual motives that are crucial for the decision to study a particular degree program, but the interplay of several motives (Oberrauch et al., 2021), and motivations can change over time and in different situations.

The decision to study and the choice of degree program depend on various factors. Study choice motives are fundamental to whether someone completes an education, whether someone later works in the sector, and how professional competences (and hence, professional success) develop (Ramm et al., 2014). Despite the increasing importance of extrinsic motives in choosing a degree program, intrinsic motives dominate the decision (Sobiraj et al., 2017; Ramm et al., 2014). Ramm et al. (2014) identify a special interest in the field of study, personal skills, the variety of career opportunities, good prospects for a secure job, and a good salary as important motives for choosing a degree program, and give the following insights: For students at UASs, the variety of career opportunities is a strong motive; in addition, income and career prospects are more important to them than to their fellow students at universities. The reasons for choosing a degree program also vary according to the chosen program. Interest in the field of study is particularly important for students in medicine, cultural studies, and natural sciences. For students in the cultural sciences, motivation is the most important motive for their choice of degree program. Job security is most important to students in medicine and economics, while income and career are more important to students in economics and law.

To summarize, choosing a degree program is a complex decision-making process in which several aspects must be considered under uncertainty (Sobiraj et al., 2017).

3. Methodology

A lot of decision-making models attempt to provide an understanding of students' choice of which HEI to attend and which degree program to follow (e.g., Punj & Staelin, 1978; Harren, 1979; Chapman, 1981; Jackson, 1982; Cubillio et al., 2006; Vrontis et al., 2007). One of the most important uses for these decision-making models is to support HEIs to market themselves more effectively to their prospective students (Vrontis et al., 2007). The so-called integrated generic higher education student-choice model by Vrontis et al. (2007) combines various student-choice models into a single model and serves as basis for this study. For the purpose of this study, it was slightly adapted to the situation of Austrian UASs (See Figure 1).
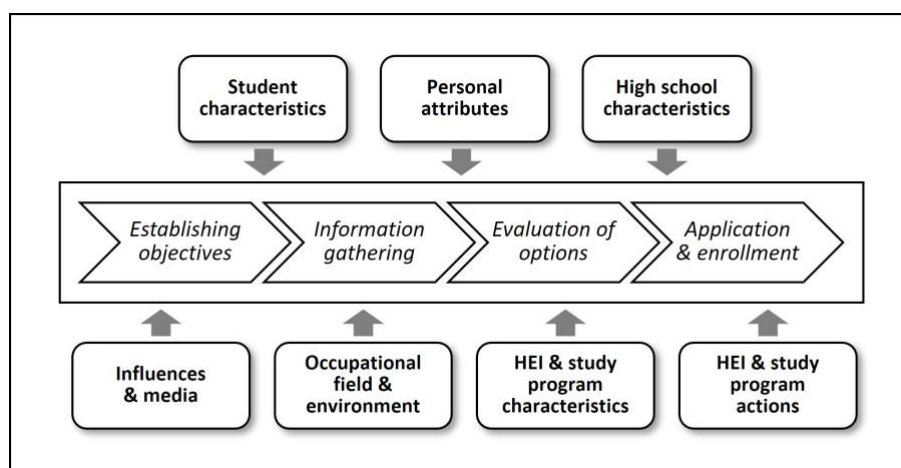
Figure 1: Adapted integrated generic higher education student-choice model
(based on Vrontis et al., 2007)

Potential students' decision-making process starts with establishing the general objective to study and other study-related objectives. Then they seek and evaluate information about various universities and degree programs. After completing applications to degree programs and the admissions processes, enrollment in a degree program takes place. This decision-making process is affected by various factors (adapted from Vrontis et al., 2007): students' characteristics (gender, age, cultural background, family background, place of residence, financial situation, occupational situation, etc.), personal attributes (interests, personal values, personal goals, lifestyle, etc.), high school characteristics (type, quality, specialization, etc.), influences and media (peers, parents, teachers, traditional media, social media, etc.), occupational field and environment (labor market, working conditions, career opportunities, image, etc.), the HEI's and degree program's characteristics (curriculum, reputation, location, price, study organization, ambience, etc.), and the HEI's actions (recruitment activities, communication, admission policies and process, etc.).

An online questionnaire based on existing literature and studies already conducted on this topic, which covers central elements of these seven factors, was developed. The online survey was conducted among students at the UAS BFI Vienna from the bachelor's degree program Logistics and Transport Management and the master's degree program Logistics and Strategic Management from September to October 2023.

4. Results

The sample comprised 128 respondents; 77% were students from the bachelor's degree program and 23% from the master's degree program. 41% of the respondents were female and 59% male, approximating the distribution of the student population.

In the following, only some of the results relating to the motives for choosing a logistics degree program are presented. The motives were surveyed using the question "How important were the following reasons for choosing your degree program?" A 5-point Likert-Scale was deployed in which "1" represents "very important" and "5" represents "unimportant." Figure 2 shows the mean values of the most important study choice motives.
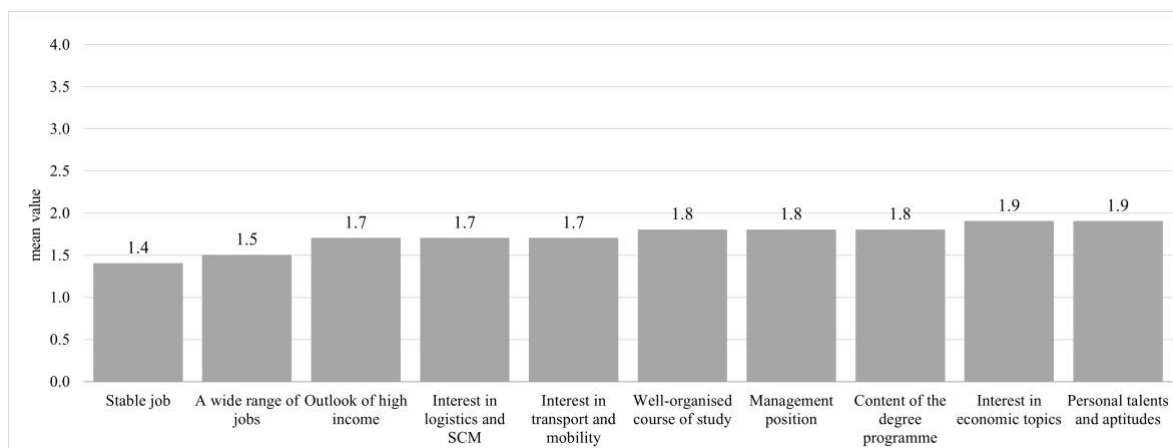
Figure 2: Mean value study choice motives I (1: very important, 5: unimportant, n = 128)

A future stable job (MV = 1.4, SD = 0.76) was the most important study choice motive for logistics students, followed by a wide variety of jobs in the logistics industry (MV = 1.5, SD = 0.76), the outlook of a high income (MV = 1.7, SD = 0.85), and a special interest in logistics and supply chain management (MV = 1.7, SD = 0.86) as well as in transport and mobility (MV = 1.7, SD = 0,87). Additionally, a well-organized course of study (MV = 1.8, SD = 1.05), good prospects for a future management position (MV = 1.8, SD = 1.08), the content of the degree program (MV = 1.8, SD = 0.80), interest in economic topics (MV = 1.9, SD = 0.93), and personal talents and aptitudes (MV = 1.9, SD = 0.85) were relatively important for the study choice. An analysis of the results by gender or degree program shows no significant deviations.

A comparison with existing studies that have not dealt with logistics degree programs, but with the choice of degree program in general, makes these results appear plausible. As mentioned before, students at UASs have different main motives for choosing a degree program than students at universities. While university students generally focus on personal development, students at UASs usually focus on the prospect of a stable job and the variety of career opportunities (Ramm et al., 2014). Results show that students do not necessarily see intrinsic and extrinsic motives as opposites; they are often quite compatible and can complement each other.

It is also interesting to note motives that were less important to the decision to choose a logistics degree program (see Figure 3). Not getting a place in the degree program of one's choice (MV = 4.1, SD = 1.35), having friends studying logistics (MV = 4.0, SD = 1.29), and published rankings of universities and UASs (MV = 3.9, SD = 1.29) were relatively unimportant study choice motives. Not having a better idea than going into logistics (MV = 3.8, SD = 1.19) was of no great significance either. The decision to study logistics seems to be a very conscious one, as recommendations from career counsellors (MV = 3.8, SD = 1.33), friends (MV = 3.5, SD = 1.25), or parents and relatives (MV = 3.5, SD = 1.34) do not have a major influence on the study choice.
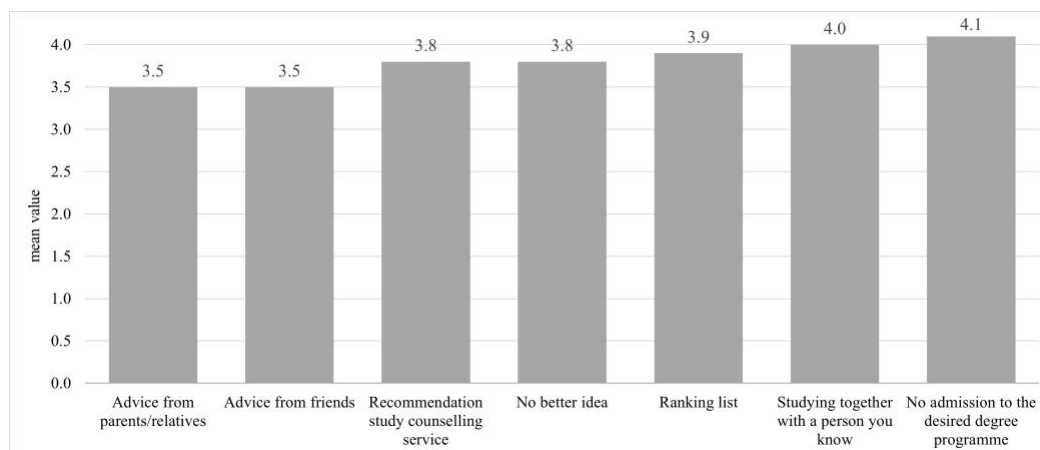
Figure 3: Mean value study choice motives II (1: very important, 5: unimportant, n = 128)

It is also worth noting that the megatrends in logistics, digitalization (MV = 2.7, SD = 1.13), and sustainability (MV = 2.6, SD = 1.14) did not play a particular role in the decision to choose logistics as a degree program. Additionally, altruistic motives such as contributing to society (MV = 2.4, SD = 1.01) and protecting the environment (MV = 3.1, SD = 1.23) had no substantial influence on the study choice.

5. Conclusion

Although the logistics sector is suffering from a severe skills shortage, employability is the most important study choice motive for logistics students at a UAS, reflecting their uncertainty regarding the future. Therefore, UASs and the logistics industry should emphasize job security and the diversity of career opportunities to attract more young people.

In line with other studies, a high future income and the prospect for a management position are very important motives for choosing a degree program among students at UASs. Studying logistics can be seen as an opportunity for social advancement, which should be emphasized more strongly in the promotional activities for choosing a logistics program at an UAS as well as the logistics industry as a potential employer.

Sustainability and digitalization do not play a particular role in the decision to choose logistics as a degree program. This opens the opportunity to address those who are interested in sustainability or digitalization but do not realize the great possibilities for pursuing these interests within the logistics industry.

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Pre-service Teachers' Perceptions Regarding Classroom Management and Learner Discipline During Teaching Practice

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Abstract

Teaching practice is a type of work-integrated learning as a period during which students work in the relevant industry to acquire specific in-service training to put theory into practice. It is an exercise aimed to expose student-teachers to the practical aspects of the teaching profession and to allow them to put their theoretical knowledge gained through classroom exchanges with their lecturers into practice. Undergraduate teaching practice is often separated into two six-week sessions that require students to participate in all elements of school life, including teaching, evaluation, and co-curricular activities. The study aims were to investigate the pre-service teachers regarding their classroom management and learner discipline during their teaching practice, so that they can be able to develop and maintain an environment conducive to teaching and learning. The study sought to determine the perceptions of the pre-service teachers regarding their classroom management and learner discipline during teaching practice. The study used qualitative methodology. The participants were teacher education students enrolled at a University of Technology. The study interviewed (10) 3rd year and (10) 4th year. Purposive sampling was used to collect qualitative data for third- and fourth-years students respectively. Thematic data analysis was employed. The results revealed a need for the pre-service teachers to be supported and inducted during their teaching practice, particularly on how to manage their classrooms and maintain discipline. The ability of pre-service teachers to manage classroom behaviour needs to be enhanced as it not only impacts on whether students can learn, but also establishes the environment and conditions under which students must learn. Classroom management is concerned with teachers' capacity to establish a functional learning environment.

Keywords: Pre-Service Teachers, Classroom Management, Teaching Practice

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1. Introduction

It is normally a great moment for schools to receive pre-service teachers to serve during teaching practice. Teaching is all about engaging students in learning; consequently, teaching is getting students involved in the active building of knowledge. A teacher must understand not only the subject content, but also how learners learn and how to transform them into active learners. Thus, good teaching necessitates a commitment to a systematic knowledge of learning. A teacher must also have basic teaching qualities to help with his or her performance, such as controlling the class, planning the lesson, grouping ability, starting, and closing a session, and recognising pupils' actions in the classroom. Busayanon (2018) emphasises that it is an important procedure for increasing learners' discipline and engagement during teaching and learning. Minami, Sanetti, and Collier (2019) investigate the complicated dynamics of classroom management, which involve enforcing proper discipline, which even experienced teachers struggle to implement consistently without the cooperation of other teachers. According to Atici (2007), classroom management is a collaborative endeavour and one of the most difficult duties for both pre-service and expert teachers. As a result, one of the most significant teacher education curriculums is pre-service teacher training. This criterion should be met by pre-service teachers since it prepares student-teachers to become effective and certified English teachers (Ulla, 2016).

Teaching Practice (TP) is at the heart of teacher training programs' preparation of aspiring and in-service teachers. Teaching, like other professions, requires specialized competencies for quality assurance and efficacy in classroom routines. This is because, in the twenty-first century classroom, effective teaching is vital since educational goals alter in parallel with the changing world. Classroom management is a critical component of every teacher's day-to-day professional experience (Korkut ,2007). Classroom management is defined by Atici (2007) as "deliberate actions taken to create and maintain a learning environment conducive to successful instruction. Teachers are the curriculum's primary drivers and direct implementers in the classroom. They provide guidance and direction to the students. Teachers, according to Mathew, Mathew, & Peechattu (2017), are the most valuable assets in any educational institution. Pre-service teachers are beginning to explore their teaching potential. As a result, teaching practice is a good place to start and the first step in implementing the principles they've acquired in academia over the past four years. Moradkhani, Raygan, & Moein (2017) claimed that teachers should be able to reflect on their own philosophy of teaching and learning. They can plan and organise learning as well as implement learning strategies (Ma'rufi, Buduyasa, & Juniati, 2017).

Pre-service teachers need to be guided and mentored during their TP. Having a mentor teacher simply means that you will be supervised, supported in your profession, coached in terms of curriculum, and assisted in improving your teaching skills. A mentor teacher is necessary to give more effective school-based help for pre-service teachers; they must understand the needs and obstacles that these pre-service teachers will face in their classrooms during their TP. Korkko, Ammala, & Turunen, (2016) argue that student teachers' learning should be promoted to the point of critical reflection, and that this should be included in the teaching practicum or in specific courses in the teacher education programme.

2. Aim of the Study

The purpose of this study is to investigate pre-service teachers' perspectives of classroom management and learner discipline in the classroom.

3. Objectives of the Study

Objectives of the study are as follows:
3.1. To determine how the pre-service teachers manage their classroom and learner behaviour.
3.2. To establish the strategies, they use for classroom management and learner behaviour.
3.3. To determine the effectiveness of the strategies.
3.4. To determine the impact that these strategies have on their self-efficacy as teachers.

4. Research Questions

4.1. How do pre-service teachers manage their classroom and learner behaviour?
4.2. Which strategies do the pre-service teachers use for classroom management and learner behaviour?
4.3. How effectiveness are those strategies they use for classroom management?
4.4. What impact does this have on their self-efficacy as teachers?

5. Review of Related Literature

Effective classroom management is a major concern for new teachers (Dicke, Elling, Schmeck, & Leutner, 2015), as well as for teachers' wellbeing (Sutton, Mudrey-Camino, & Knight, 2009) and their students' academic success (Evertson & Weinstein, 2013). Classroom management has been defined as a sequence of activities aimed at creating an environment in which students engage in learning activities designated by the teacher and disruptive behaviours are kept to a minimum (Emmer, 1984). Sahin (2015) defined classroom management as the process by which teachers develop the necessary organisation to create and sustain an environment conducive to learning. Wong and Wong (2014) define classroom management as "all that an educator does to organise the learners, space, time, and materials so that student learning can occur. According to Kellough & Kellough (2011), effective classroom management is the act of creating and running a classroom to maximise student learning. A poorly managed classroom is incompatible with the craft of teaching and learning. According to Sahin (2015), all teachers share the goal of promoting task-oriented instruction that fosters constant improvement of classroom management. Classroom management, according to Christofferson and Sullivan (2015), must include strategies that emphasise classroom norms, support efficient transitions, supervise student activities, and explain appropriate classroom behaviour. The function of classroom management tactics must be considered alongside the strategies used to deliver each lesson (Eisenman, Edwards, and Cushman ,2015).

Many teachers are unprepared for student behaviours in the classroom, which makes teaching and learning difficult (Flower, McKenna, & Haring, 2017). When their universal approaches fail, they should revert to them. Self-efficacy and the teacher's personality are also important elements in classroom management (Saleem and Muhammad 2020a). Classroom management self-efficacy refers to teachers' beliefs about their ability to execute classroom management tasks such as engaging with individuals and groups, setting classroom guidelines, expectations, and rules, and managing disruptive behaviour (Pfitzner-Eden, Thiel, & Horsley, 2015). Student behaviour is one of the most difficult challenges in the classroom; professional approaches are required to aid prospective instructors in developing strategies that encourage responsible attitudes and the use of analytical abilities in students (Hani, Muhammad, & Mahmood 2022).

5.1. Pre-service Teachers Regarding Classroom Management and Learner Behaviour During Teaching Practice

Classroom management is a significant contribution to the effective teaching and learning process in the classroom. Poor classroom management is usually associated to misbehaviors that interfere with teaching and learning and cause great stress (Rosas & West, 2009). The primary goal of classroom management is to guarantee that conduct is minimized rather than to minimize interruptions during the teaching and learning process (Sivri & Balci, 2015). Exposure to a real-world classroom environment equips the pre-service teachers with the necessary abilities to deal with crises that disrupt the teaching and learning process. However, this does not imply that the abilities they gained as teacher trainees are sufficient for them to supervise courses. However, exposure to fundamental classroom management skills implies that some may be well-prepared, but others may be unfamiliar with controlling classes as they present their lectures (Sethusa, 2020).

As a result, classroom management is frequently discussed alongside behaviour management, including positive and negative reinforcement. Challenging behaviour is a regular problem for special education teachers. If teachers do not deal with the challenging behaviour, it might disrupt the learning session and lead to fatigue (Yunus &Mohammed, 2019). Teachers who are skilled in classroom management, on the other hand, can effectively control students' behaviour difficulties. Many studies have shown that teachers who have a solid knowledge and comprehension of behaviour management may handle this issue confidently and positively (Butler and Monda-Amaya, 2016; Ahmad and Haifah, 2015). In essence, preservice teachers are expected to have learned how to govern and maintain order in the classroom during the teaching and learning process. Thus, if preservice teachers can effectively manage classrooms, there is a good chance that they will be able to assure effective teaching and learning to achieve learning outcomes.

5.2. Pre-service Teachers' Self-Efficacy and Professional Development in the Journey of Becoming Teachers

Self-efficacy beliefs are self-evaluations of one's ability to do an action successfully in a specific setting (Bandura, 1997). As a result, teachers' beliefs about their abilities to impact students' learning are self-assessments. Self-efficacy views (referred to hereafter as self-efficacy) are influenced by four sources that give individuals with knowledge about their own capacities, according to Bandura's (1997) social cognitive theory: (1) mastery encounters, (2) vicarious encounters, (3) social encounters, and (4) physiological and affective states. Influence their teaching behaviours (Bandura, 1997), pre-service teachers' self-efficacy beliefs at the start and end of practicum teaching experience would be helpful because these perceptions may have significant implications when they practice their profession. Pre-service teachers must therefore examine and analyse the effect of their self-efficacy beliefs on their ability to teach as well as their actual abilities during teaching practice. Even though teacher self-efficacy is important in assessing student involvement and implementing instructional strategies, teacher efficacy in classroom management has been a struggle for teachers (Carr, 2013). Dicke, Parker, Philip & Marsh, Herb & Kunter, Mareike & Schmeck, Annett & Leutner, Detlev (2014) studied 1227 German preservice teachers to see how teacher efficacy and student misbehavior influence teacher attrition. The findings revealed that emotional disturbance, as well as emotional exhaustion, was a stronger predictor of low self-efficacy in classroom management. Yin (2019) conducted an empirical study to assess a methodological course meant to increase the readiness of Chinese pre-service EFL teachers

to teach in a 4-week practicum in secondary schools. 15 pre-service teachers kept reflective notebooks during the practicum time. The results showed that the semester teacher training methodology course improved pre-service teachers' topic understanding by bridging the gap between theory and practice; however, the programme did not improve teachers' self-confidence in their communication skills.

5.3. Strategies Used by Pre-service Teachers for Classroom Management and Learner Behaviour and Its Effectiveness

According to a study conducted in Australia, preservice teachers regard classroom management as a significant issue (Peters, 2012). This view may imply that, despite having classroom management skills, preservice teachers have some difficulties. Some solutions to this problem include, but are not limited to, organising the physical layout of the classroom, organising teaching learning support material (LTSM), engaging instruction, matching learners' ability levels, routinizing procedures, applying positive behaviour supports and behavioural interventions, teacher monitoring, and delivering highly prepared lessons (Brophy, 2006). Christofferson and Sullivan (2015) argued that preservice teachers should set classroom rules, promote smooth transitions between teaching and learning activities, monitor learner performance, and communicate classroom behaviour awareness. These are the strategies that preservice teachers should be familiar with before beginning their teaching practice. If preservice teachers do not initiate and apply the above strategies for successful classroom management, they may find it difficult to control their classes during teaching practice.

6. Method

The study followed a qualitative approach. The interviews through focus group discussions were used to collect data as it enabled the researchers to interact with the participants in a way that allows them to openly express their feelings. Participation was solely voluntary. The conversations were guided by a focus group timetable. All participants were advised that the collected information would be kept confidential and that their names would not be used. The participants were referred as ST 1 to ST 10.

7. Findings

The pre-service teachers shared their views regarding their perceptions on classroom management and learner discipline during teaching practice. The participants indicated that they need support from their mentor teachers and assistance on how they should manage their classrooms as new teachers in the field. They also alluded that, during teaching practice they need to be informed of the things that they need to do, rather than being passive in some classrooms. Two research questions guided this study, and themes emerged from the data analysis. Student teachers' adequate preparation/ability to transfer theory into practice. In the study of Marais and Meier's (2000) where participants found a difference between theory and reality of teaching, and where respondents indicated that they could not reconcile the teaching methods as explained during their lectures with those used in schools by teachers, respondents in this study indicated that they were prepared and able to translate theory into practice, as well as that they were able to apply them.

The data revealed that, current practices that the pre-service teachers they can use in their classrooms, are with using positive reinforcement, they need to praise the learners on their

achievement they received on their tasks. The findings indicated that effective classroom management, on the other hand, entails more than just maintaining a sense of order or control; it also entails the development of healthy teacher-student connections as well as a grasp of instructional practices and environmental modifications. Classroom management and instructional management are intertwined since both processes include activities made by teachers to establish safe and effective learning environments that optimize instructional time (Alter and Haydon 2017; Cooper, Gage, Alter, LaPolla, MacSuga-Gage, & Scott 2018).

7.1. Research Question 1: *What Are The Current Practices Around Classroom Management for Third- And Fourth-Year Students in Teaching Practice?*

How Do Pre-service Teachers Manage Their Classroom and Learner Behaviour?

The findings revealed that the students' teachers need guidance regarding classroom management. The data also shows that the students teachers need the support of the mentor teachers, so that they can assist them in managing the behaviour of the learners in their classrooms. According to (Dicke, Elling, Schmeck, & Leutner 2015) strong classroom management can help to alleviate novice teachers stress and the "shock" of a new teacher's first classroom experience. As a result, it is not unexpected that new teachers across the country, particularly new special education instructors, seek mentorship, support, and further classroom management training (Fowler, Coleman, & Bogdan, 2019). Mentorship is an essential component of teacher induction, and new teachers who do not receive mentorship leave the field far sooner (Grey & Taie, 2015). According to Bistari (2017), effective teaching indicators include success in classroom management, success in the communicative process, good quality of students' responses, success in the learning process, and success in the lesson's objectives.

Which Strategies Do the Pre-service Teachers Use for Classroom Management and Learner Behaviour?

The findings indicated that pre-service teachers prefer to design activities that stimulate involvement and draw the learners' attention. These enjoyable exercises drew learners' attention to the lesson. Other techniques included having a good loud voice, being active in class by moving from one student table to the next, and the need to be severe. Merç and Subaşi (2015) stated that pre-service teachers' pay attention to them through making eye contact, reminding them, showing interest in them, rearranging students' seat rows, and having individual conversations after class.

How Effectiveness Are Those Strategies They Use for Classroom Management?

The findings revealed that the strategies that the pre-service teachers use in their classroom are more effective and they can draw the attention of the learners. The ultimate purpose of education is to enhance learners' competencies, and the message is conveyed to learners through words and gestures (Daskan &Yildiz, 2020). Body language is the component of teaching that draws the most attention from students. It is not essential what you say, but how you express it.

What Impact Does This Have on Their Self-Efficacy as Teachers?

The findings indicate that a teacher with a low self-efficacy might led to failure and teaching and learning won't be successful. As a result, self-efficacy can impact task selection as well as task persistence. Teacher self-efficacy (TSE) is referred to as instructors' beliefs in their abilities to organise, plan, and carry out actions necessary to affect students' valued educational objectives and results (Klassen, Tze, Betts, S & Gordon,2011). To increase instruction quality, it is necessary to recognise instructors' strengths and limitations in terms of their actual teaching practices.

Classroom management is the process through which teachers ensure that their pupils' disruptive behaviour does not interfere with the delivery of education. It encompasses both the proactive avoidance of disruptive behaviour and the appropriate response to it when it occurs.

Themes identified from the content analysis of student teachers' perspectives on classroom management include instruction management, behaviour management, teacher communication skills, and classroom physical Organisation. Pre- service teachers defined classroom management as all tactics and behaviour used by teachers to deliver content and conduct lessons effectively. One pre-service teacher stated:

8. Classroom Management and Communication Skills

> *It is difficult these days to reprimand the learners in the classroom, these learners are so misbehaving, I find it difficult to manage my classroom during teaching practice and it seems as if I am not doing my work.* (ST 1)

> *I discovered that learners became enthusiastic, and they actively participated in activities when they were praised and rewarded for their efforts and that's when you will be able to manage your classroom.* (ST 2)

> *Learners were unable to communicate in English, while I was unable to communicate in Sotho, resulting in pandemonium in my classroom.* (ST 3)

> *Another thing is the issue to teaching the learners, jooooooooooo, eish I struggle because what we are taught here is not what we experience in schools, if we can be given some opportunities on how to deliver or teach the learners during micro-teaching.* (ST 4)

This was support by (ST 5, ST 6 and ST 7) the pre-service students indicated that, if the module of SBX and Micro- teaching to be incorporated with the guidance on how to manage classrooms, deliver the subject content, they alluded that, they need strategies that they can employ in their teaching practice. Teachers who are confident in themselves and their teaching abilities have a greater impact on pupils and may easily influence them. They can recover from stress and maintain solid control over their teaching approach, all of which lead to pupils becoming extremely self-reliant (Hoy and Bandura, 2003).

> *Teaching practice is not difficult, I enjoy it but eish, when it comes to the issue of ill-discipline learners, it becomes difficult for you to teach them, how can you teach in a class full of noise.* (ST 10)

It is evident that the pre-service teachers need guidance during their teaching practice, they need to be assisted on how to deliver the subject content, manage the classroom. This had an impact on the student teachers' performance during teaching practice as well as their opinion of the teaching profession in general. This was also illustrated by Samu (2020), who stated that one of the major challenges faced by preservice teachers is the lack of physical connection with students, as well as the potential complexities associated with handling the emotional component of these meetings (Samu, 2020). Similarly, Sepulveda-Escobar and Morrison (2020) revealed that preservice teachers reported feeling very uncomfortable and having less passion to teach due to a lack of direct connection with pupils. Teachers should acquire classroom management strategies to establish a learning environment that improves both academic skills and social-emotional development of children to promote students' performance in school (Milliken, 2019). Unfortunately, data shows that most teacher training programmes devote little time to classroom management teaching. It has also been demonstrated that well-managed classrooms result in students who participate while achieving high levels of success (Milliken, 2019).

Learner Discipline

Similarly, to Marais and Meier's (2004) results, where respondents reported a decline in moral standards in schools and a lack of discipline, most respondents in the current research said that discipline was virtually non-existent in most institutions. One responder stated:

> *Learners were very unruly because there were no effective disciplinary measures in place. Cell phones were permitted in class, which I found quite distracting.* (ST 9)

> *Learners had the notion that we were their age peers, thus they did not respect us. There is absolutely no discipline. Learners are impolite. It is difficult to keep the class under control. Even when the teacher is there, students are playing cards and eating in class.* (ST 6)

Contrary to the negative responses above, respondents (ST 5 and ST 4) from one school stated that students were well behaved and actively participated in class activities.

> *Learners respect us as teachers, though some believe that because we are student teachers, we don't have the power/authority to punish them.*

Therefore, the manner student teachers were accepted and treated differed from school to school. Most student teachers in this study stated that they struggle with classroom management, learner discipline and subject content at their placement schools, which resulted in other teachers and learners not appreciating them. This had a considerable impact on student teachers' performance during classroom practice and a negative impact on their overall view of the teaching profession. Student teachers were severely constrained by learner discipline. The instructional atmosphere did not allow student teachers to put their academic education into practice. It's possible that student teachers weren't sufficiently prepared for the real-world situation in which they were intended to teach.

8.1. Strategies That Pre-service Teachers Can Use for Classroom Management and Learner Behaviour

Improving self-confidence: When beginning to teach for the first time, pre-service teachers are frequently frightened. Their nervousness is frequently caused by offering incorrect explanations throughout the session, which leads to pupil misunderstanding. However, no matter how frightened they are, they must be able to manage their anxiety. One solution is to provide clear, calm, and brief instructions as well as a strong visual assistance. It allows pupils to focus on what the pre-service teachers are saying and easily grasp the teaching. Merç and Subaş (2015) also stated that asking students to repeat the teaching is one technique to verify student comprehension. Therefore, pre-service teachers need to enhance their self-efficacy so that they may be able to deal with classroom challenges during their teaching practice.

Planning the lessons. When pre-service teachers lead a group discussion or activity, students may choose to do whatever they wish. Some kids may converse extensively with their peers, while others may keep mute in the group. This issue has the potential to disrupt class activities. In such a case, pre-service teachers should thoroughly prepare the lesson prior to their class lessons.

The results of this study revealed the pre-service teachers need guidance to improve on their teaching performance. They need to be empowered with strategies to improve on how their classroom management skills as well as dealing with ill-discipline learners. Teaching practice is an important tool that can enhance the pre-service teachers' teaching performance. The results also indicate that pre-service teachers require assistance from both their mentors and their principals to be able to improve on their self-confidence, how to deliver content effectively and efficiently and on how to plan their lessons thoroughly. Without their support and induction, students may develop poor self-esteem. Feedback is critical in assisting them to correct any flaws made throughout their teaching practice.

9. Conclusion

Teachers do require expertise to teach well in a variety of areas, such as criticism and praise, handling mistakes, student inquiries, and properly designed sessions. Also, to regions lowering anxiety and motivation. When praise is genuine and genuine, it is most effective. They must complement them with suitable gestures and behaviors. Teachers should aim to inspire kids so that they would be more inclined to pay attention. Respect is also essential while dealing with youngsters. Responding favourably to incorrect responses is a constructive method to teach. The classroom setting is crucial. Creating a healthy classroom atmosphere is one of the key reasons that children enjoy going to school, and children also enjoy learning. Teaching practice is an important part of personal development since it allows student teachers to achieve their objectives, such as improving their teaching performance and self-efficacy, as well as classroom management.

To successfully train future teachers, every educational institution should embrace micro-teaching. As a result, teacher educators in teacher education programmes, particularly those at higher learning institutions, should plan and conduct micro-teaching in pedagogical courses to improve student teachers' teaching competences and performance. Furthermore, professional instructors should supervise first-year student teachers in both the primary and

secondary levels of micro-teaching and observation activities so that the student may be able to enhance their teaching performance.

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Nurturing Inquiring Mind Through the Quest of Augmented Reality: An Experiential Learning Approach

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Abstract

Nurturing students' inquiring minds is essential as it encourages curiosity and critical thinking, both of which are tools for independent learning and problem-solving. In this study, we examined the effects of AR-Quest activities integrating with the experiential learning approach on undergraduate students' inquiring minds. Thirty Thai undergraduate students participated in the study, which spanned a three-week period, where students were asked to do AR quests. The AR quests were designed to be inquiry-based, fostering students' discovery, collaboration, and reflection. The AR quests encompassed a confirmation quest, a discovery quest, and a collection quest. We used a 5-point Likert scale survey questionnaire to collect data on the students' curiosity, critical thinking skills, and willingness to explore new ideas. Descriptive statistics was employed to calculate mean scores and standard deviation. The findings revealed that the AR-Quest activities stimulated the students' curiosity, promoted their critical thinking, and enriched the learning experience. Additionally, the findings suggested that the experiential AR activities could foster an engaging learner-centred environment that encouraged exploration, questioning, and discovery. In this regard, integrating experiential learning with AR technology facilitated a shift from a conventional classroom paradigm to a more dynamic, interactive learning regime, making learning meaningful and nurturing students' inquiring minds. However, in future studies, researchers/educators are recommended to consider a controlled group comparison to provide a comparative baseline to measure the effectiveness of the experiential AR-Quest activities.

Keywords: Augmented Reality (AR), Experiential Learning, Inquiring Mind

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Introduction

Teaching and learning processes should inspire and captivate students' minds and imaginations (Pugh & Girod, 2007). McDougall (2014) states that students achieve their best in learning when they are involved in the learning content and focus on the subjects being learned. In experiential learning, practical learning activities form the core of meaningful learning experiences (Itin, 1999). This engagement unfolds across various levels of student participation (Hawtrey, 2007).

In traditional teaching approaches, having students explore learning quests usually ends with boring learning (Warda & Mohammed, 2016). However, learning quests where experiential learning and augmented reality are integrated can improve student engagement in learning activities (Carmigniani & Furht, 2011; McDougall, 2014). By providing students with hands-on experience related to the learning content, students, experiential learning and augmented reality facilitate a more meaningful and impactful knowledge learning (Masood & Egger, 2019; Yardley, Teunissen, & Dornan, 2012).

Lessons integrated with experiential learning and augmented reality technology can engage students more than many traditional lessons do (Gopalan, Bakar, & Zulkifli, 2017; McDougall, 2014). Combining the two approaches encourages students to look deep into what they are learning and critically apply, analyze, synthesize, and evaluate what they learn (Carmigniani & Furht, 2011; Haynes, 2007). The experiential augmented reality approach transforms the learning environment into a dynamic space that fosters inquiry-based learning, enabling students to develop and refine their inquiring minds. (Cannon & Feinstein, 2014; Carmigniani & Furht, 2011).

When lessons are experiential, situated, authentic, and contextual, the learning will be evocative, germane, memorable, and entertaining for students (Hawtrey, 2007). Consequently, these improve students' learning outcomes and encourage them to develop their inquiring mind of the love of learning (McDougall, 2014). In this paper, we explored how augmented reality quests based on the experiential learning approach can promote student inquiring minds.

Literature Review

Experiential Learning in Education

Experiential learning is a dynamic, student-centered approach that promotes active engagement, critical thinking, and problem-solving skills (Yardley et al., 2012). It plays a crucial role in education by providing students with hands-on, real-world experiences that enhance their learning and development (Haynes, 2007; Yardley et al., 2012). Experiential learning can engage students in learning, moving beyond passive listening and reading. This pedagogical approach encourages active participation in activities, experiments, and real-world simulations (Yardley et al., 2012), fostering deeper understanding, critical thinking, and problem-solving skills (McDougall, 2014). The shift from passive reception to active engagement represents a fundamental aspect of experiential learning, aligning with educational concepts emphasizing the importance of hands-on involvement in the learning process (Choi & Hwang, 2017). Moreover, experiential learning strongly emphasizes the practical application of knowledge and skills (Murphy, 2007). When students are provided with opportunities to transfer theoretical concepts into real-world situations, this approach

enables them to perceive the relevance and practicality of their academic pursuits. Applying knowledge in practical contexts enhances students' problem-solving abilities and facilitates bridging gaps between theoretical understanding and real-world implementation (Yardley et al., 2012).

Augmented Reality in Education

AR technology has gained significant attention in education due to its ability to create interactive and immersive learning environments (Masood & Egger, 2019). By overlaying digital content onto the real world, AR enhances students' understanding of abstract concepts and promotes active learning (Carmigniani & Furht, 2011). Previous studies have demonstrated the effectiveness of AR in various educational domains, including science (Gopalan et al., 2017), mathematics (Bujak et al., 2013; Estapa & Nadolny, 2015), and language learning (Eang & Na-Songkhla, 2020).

However, integrating augmented reality in education comes with certain challenges. One of the primary challenges is the cost and accessibility of AR devices and software (Rabbi & Ullah, 2013). Content development poses another challenge, requiring teachers to ensure alignment with learning objectives and provide meaningful learning opportunities (Lee et al., 2021). Technical considerations, including connectivity and device compatibility, must be addressed to ensure seamless implementation (Masood & Egger, 2019). Ethical and privacy concerns, especially relating to the collection and analysis of student data, represent additional dimensions warranting careful consideration in the implementation of AR technologies in educational settings (Bodkhe, Verma, Saraswat, Bhattacharya, & Tanwar, 2022).

Inquiring Minds via Experiential Learning

Houle (1961) is the first person to explain adult learners' motivation for learning and learning outcomes in non-formal education. His famous book, The Inquiring Mind (Houle, 1961), published concepts about adult education and self-learning basics. Houle describes many features of adults in informal learning activities. For example, each student is committed to what they learn, has educational goals, is happy with the learning process, and sees the value of education (Houle, 1961). In addition to research on the learning characteristics of adults, Houle classifies students into three groups:
1. Goal-Oriented Learners: this group of students will use education to achieve their goals. They believe education is a way to solve problems and respond to their interests.
2. Activity-Oriented Learners: this group of students will participate in activities or do things of interest to them in the learning context. This group will admit directly that they come to study for reasons other than learning.
3. Leaning-Oriented Learners: this group of students will participate in activities to learn about what they have in mind. They are committed to learning activities and see education as fun. This group of students can guide themselves to learn better than other groups.

Houle (1961) believes that experiential learning is one effective method used in promoting students' inquiring minds, which can engage students in the lessons by using experiences as the primary approach to learning. Lessons where there is the integration of an experiential

learning approach foster student inquisitiveness and nurture their inquiring mind, allowing them to get on well with the technologically driven world (Houle, 1961).

Nurturing Inquiring Minds Through Augmented Reality

There are few research studies on using AR-Quest activities to nurture students' inquiring minds. However, it is interesting to look at how the quest activities with AR technology shed light on this field. AR-Quest activities can be designed to confirmation quests that allow students to validate or confirm existing knowledge or concepts (Eang, 2019). These quests allow students to apply their prior knowledge and verify its accuracy through interactive AR experiences. By engaging in confirmation quests, students can deepen their understanding of concepts and develop confidence in their knowledge (Hill & Knutzen, 2017). Nurturing students' inquiring minds can also be done through discovery quests, designed to foster curiosity, exploration, and independent learning (Supratman & Wahyudin, 2021). These quests encourage students to investigate and discover new knowledge or concepts through AR experiences. Discovery quests promote active engagement and critical thinking as students explore virtual environments, analyze information, and make connections between different concepts (Kaur & Kauts, 2018). Collection quests can also be used to nurture students' inquiring minds. This type of quest usually involves students gathering and organizing information or objects related to a specific topic or theme (Eang, 2019).

AR-Quest Framework

Eang and Na-Songkhla (2020) developed an AR-Quest framework for teachers to adapt to design interactive and effective language learning. Table 1 gives a brief summary of the framework.

Table 1. Overview of AR-Quest Framework by Eang and Nasongkhla (2020)

Characteristic
• Learning activities are inquiry-based.   • Students learn together in a semi-structured approach.   • Learning activities are linked with real situations, and students learn by experiencing them.   • Authentic learning tasks promote both students' social and physical engagement. The authentic learning experience is promised.
Grounded theories
• AR-Quest Model is based on experiential learning theories and inquiry-based learning theories.
Process
• *Analyze objectives*: objectives are what keep teachers on the right track. To analyze learning objectives, the existing curriculum and syllabus are to study.   • *Analyze the context*: teachers determine who the students are and also identify the learning context.   • *Plan*: teachers need to be clear with the learning objectives and determine learning resources that students will need to solve the quests.   • *Prepare*: teachers prepare resources and other necessary tools and make sure everything is in place when needed to be used.   • *Design*: script the learning activities based on the ideas and preparation from the previous steps.

• *Facilitate*: teachers hold back to give students assistance to complete answers to their questions. Instead, teachers help students through quest exploration and encourage to discover the solution on their own. • *Evaluate*: teachers use the assessment techniques/tools which are planned in the earlier steps. Students' learning progress can be assessed in discussion and reflection sessions.	
Resource	**Assessment**
• Learning resources are to be well-prepared before the quest discovery. • Primary resources for AR-Quest activities include worksheets, AR materials (AR markers), and AR mobile application.	• Assessment tools for the quests of augmented reality vary to each quest's design. Students can be assessed by observation and tests.
Teacher's role	**Students' role**
• Teachers explain the purpose of experiential learning to students. • Teachers are less dominant in the AR activities classroom. • Teachers promote authentic learning experience positively. • Teachers provide a situation or an experience that attract students' interest. • Teachers link learning objectives with authentic situations or experiences. • Teachers provide students any helpful resources to help students solve the AR quests. • Teachers allow students to explore, investigate, and uncover answers on their own.	• Students have their hands on practically authentic problems. • Students are involved in difficult and challenging tasks while exploring the AR quest. • Students are given freedom in the whole learning process if they make positive progress. • Students do self-evaluation on their learning progress. • Students learn from challenging tasks and become willing to change. • Students form new knowledge from the learning activities.

Methodology

Sample

The study involved a sample of thirty Thai undergraduate students who participated in a three-week exploration of AR-Quest activities. The students were exposed to experiential learning approaches integrated with augmented reality (AR) technology through confirmation quests, discovery quests, and collection quests.

Procedure

This research study lasted for three weeks, with 3 hours each. Before introducing the treatment, the students were asked to complete a self-evaluation survey questionnaire. In each week, students were introduced a new AR-Quest activity. In the first week, a confirmation quest was introduced to the students. The quest was a vocabulary verification activity where students used the mobile with AR application installed to scan printed images (markers) related to specific vocabulary words. The AR application then provided audio and/or visual cues to confirm the correct pronunciation and meaning of the words. This interactive experience allowed students to validate their Khmer vocabulary knowledge and reinforce their understanding of word meanings and pronunciation.

In the second week, they were asked to complete a discovery quest. This quest was designed to encourage students to explore the linguistic connections between Khmer and Thai, sparking curiosity about the similarities and differences in vocabulary. In this discovery quest, students were to analyze linguistic patterns and connections, requiring critical thinking skills as students later on reflected on the shared and distinct characteristics between the two languages. The quest also promoted a willingness to explore linguistic diversity and cultural connections, fostering an open-minded approach to language and communication.

In the last week, the students were asked to complete a collection quest. Students were required to listen to audio and observe 3D models representing Khmer words for stationery tools. To complete the worksheet, they needed to apply critical thinking skills to match the Khmer words with their Thai equivalents. The use of AR technology added a dynamic and interactive element that made the learning experience more enjoyable and fostered a positive attitude toward exploring new concepts.

After the last session, the students were administered the same survey questionnaire used to compare with their previous questionnaire data.

Figure 1: Students are doing AR-Quest activities.

Research Instrument

The research instrument for data collection in this study was a self-evaluated questionnaire. The questionnaire consisted of three independent sections, including 1) curiosity, 2) critical thinking, and 3) willingness to explore new ideas, with five items each to assess students' inquiring minds.

Data Collection

The data from the questionnaire during the pre- and post- treatment were calculated to find the mean and standard deviation (SD). Then, the paired sample t-test was used to examine the changes in students' inquiring minds before and after the treatment.

Results and Discussion

In this study, we used the T-test analysis to assess the impact of the AR-Quest activities on the students' perceived inquiring minds. Thirty participants were involved in the study, and the paired differences between pre- and post-treatment self-assessment scores were examined.

Table 2. T-test results of the students' inquiring minds before and after the intervention

Self-Assessment	N	Paired Differences		Sig
		Mean	SD	
Post – Pre	30	5.466	1.105	0.001*

Based on Table 2, the mean was 5.466, representing the average change in students' self-assessment scores, with a standard deviation of 1.105, indicating the variability among participants, with the p-value of 0.001, indicating a highly significant difference in students' perceived inquiring minds after engaging in the AR-Quest activities. This suggests that the AR-Quest activities were effective in fostering students' inquiring minds.

Table 3. Inquiring Mind Components

Pair (Post – Pre)	N	Paired Differences		Sig
		Mean	SD	
1 Curiosity	30	1.700	1.022	0.001*
2 Critical Thinking	30	2.100	0.711	0.001*
3 Willingness to Explore	30	1.666	1.061	0.001*

The research findings, as presented in Table 3, provide a detailed examination of the impact of AR-Quest activities on specific components of the students' inquiring minds. While Table 2 initially indicated a potential improvement in the students' inquiring minds, Table 3 delves into the nuances by investigating the three key elements: Curiosity, Critical Thinking, and Willingness to Explore.

Regarding the curiosity component, the mean paired difference of 1.700 indicates a significant increase in students' self-perceived curiosity following the engagement in the experiential AR-Quest activities, with a p-value of 0.001, providing strong evidence that these activities effectively fostered curiosity among participants. This aligns with foundational principles of experiential learning, as argued by Huang (2019) and Moorhouse, tom Dieck, and Jung (2019), who argue that hands-on experiences and active engagement by augmented reality promote curiosity by encouraging students to explore and question their surroundings.

Examining critical thinking, the mean paired difference of 2.100 signifies a substantial improvement in the students' critical thinking skills from the experiential AR-Quest activities, with a p-value of 0.001. This indicates that the experiential AR-enhanced learning activities positively contributed to the development of critical thinking among students. This finding supports prior research highlighting the benefits of experiential learning activities in fostering critical thinking skills, as emphasized by Rogers et al. (2023) and Huang (2019), who argue that experiential learning creates authentic environments requiring students to apply critical thinking skills in problem-solving tasks.

Lastly, regarding the willingness to explore, the mean paired difference of 1.666 indicates a noteworthy increase in students' openness to exploring the subject matter, with a p-value of 0.001. This emphasizes the positive impact of experiential AR-Quest activities on fostering a sense of exploration among the students. The perceived improvement in students' willingness to explore aligns with experiential learning literature, emphasizing the importance of hands-on experiences in promoting openness to new ideas and experiences, as articulated Konak, Clark, and Nasereddin (2014) and Huang (2019).

Conclusion

The research findings offer valuable insights into the transformative potential of experiential learning and augmented reality (AR) in fostering student inquiring minds. The integration of AR technology with experiential learning approaches emerges as a promising approach for teachers, providing a dynamic and learner-centric framework that nurtures active and inquiry-based learning.

The observed statistically significant improvement in the students' inquiring minds underscores the effectiveness of the experiential AR-Quest activities in fostering a holistic development of students' cognitive abilities. These findings carry implications for teachers and curriculum developers as they emphasized that augmented reality, when incorporated into learning experiences, presented a valuable opportunity to transcend traditional teaching methods. By recognizing the potential positive impact of AR-Quest activities, teachers can design innovative learning experiences that captivate students' interest and stimulate their inquiring minds.

Recommendations

This study employed a one-group pre-test and post-test design involving a 3-week intervention. For future research studies, researchers should consider incorporating a controlled and experimental group comparison. This addition would offer a comparative baseline, allowing for a more comprehensive assessment of the effectiveness of experiential AR-Quest activities. Additionally, extending the duration of the study to a longer time frame is recommended for a more nuanced understanding of the sustained impact of the intervention.

Acknowledgements

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The Contradictions of Implementing Flipped Classrooms at Pre-university Education: An Activity Theory Perspective

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Abstract

A limited body of research has investigated on the factors that primarily affect the implementation of Flipped Classroom Model (FCM) at pre-university education. This study aims to uncover the contradictions that emerge when applying a whole-school FCM approach in a pre-university institution in Brunei Darussalam. The Activity Theory (AT) lens was applied to examine the intricate dynamics of FCM activities from various perspectives. Combining questionnaire data with semi-structured interviews revealed a multi-faceted view of the participants, shedding light on both the adoption and non-adoption of FCM. The discursive manifestations of the identified contradictions unveiled numerous dilemmas, conflicts and critical conflicts within the activity system. Interestingly, teachers' positive attitude and disinterest for FCM co-exist, primarily due to the 'conflicting' nature of the A Level curriculum within the pre-university education system. A range of contradictions emerged encompassing disparities in pedagogical approaches, lack of ICT skills and insufficient familiarity with FCM amongst teachers. Furthermore, the study underscored contradictions evident in students' struggle to embrace self-directed learning, coupled with a preference for procedural learning over conceptual learning, further exacerbating the conflicts within the activity system. These findings substantially contribute to our understanding of how participants are affected by contradictions inherent within and between the elements of the FCM activity system. By utilising AT as an analytical tool, educators, administrators, and researchers can proactively anticipate challenges and devise solutions to address contradictions that might hinder the effective integration of FCM within the existing pre-university education framework.

Keywords: Flipped Classroom Model, Activity Theory, Contradictions

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Introduction

Aligning pre-university education with the Flipped Classroom Model (FCM) may seem straightforward in theory, but its practical application presents challenges in effectively merging efforts to benefit pre-university students. Despite its intuitive appeal and promising outcomes, achieving this alignment proves complex due to various factors, such as overly mechanistic viewpoints and a lack of strong theoretical foundations. To deepen our understanding of this dynamic interplay between educational domains and teaching methodologies, we propose adopting a theoretical perspective rooted in Activity Theory (AT). Through this lens, we aim to address limitations in existing research and explore the complexities and obstacles of aligning pre-university education with the FCM.

This analytical approach aims to enrich our understanding of the shift towards blended learning in a pre-university setting by presenting a well-grounded theoretical viewpoint. Building on AT, we argue that pre-university education and the flipped classroom model constitute interconnected yet distinct activity systems. AT provides a structured framework for analysing these systems, their elements, and their intricate connections. By leveraging AT's concept of tensions, it enables the identification and resolution of misalignments within and between these systems, driving their mutual development. Thus, AT offers a comprehensive framework for describing and examining the intricate relationships between these two domains.

To illustrate the effectiveness of AT in understanding the alignment between pre-university education and the FCM, we conducted an extensive case study focused on this institution. Our analysis spanned three school terms of implementing the FCM and delved into how pre-university education and FCM evolved within the intricate organisational setting. Our empirical findings highlight that consistently addressing emerging tensions within and between these systems, coupled with implementing necessary adaptations, fosters the co-evolution of both systems. While more research is necessary to validate this framework's practicality, our initial evidence suggests that employing activity system analysis empowers practitioners to systematically identify and resolve misalignments.

Utilising AT for School Transformation Initiative

AT stands as a contemporary paradigm for analysing and reshaping collaborative activities embedded within social contexts and their associated networks. At its core, this theory asserts that human psychological processes' structure and evolution stem from culturally mediated and historically evolving practical activities (Leont'ev, 1978; Luria, 1979; Vygotsky, 1978). Cole (1996) underscores the importance of incorporating the social-institutional context of the activity when conducting a cultural-historical analysis.

Originating from Vygotsky (1978) and Leont'ev's (1978) foundational work, AT builds upon the premise that human activity inherently aims toward an object (Engeström, 1995) and is mediated by various tools that enhance achieving desired outcomes (Blackler, 1993). This mediating network is typically represented as a fundamental activity system model, depicted as a triangle involving a subject, object, and tools (Vygotsky, 1978).
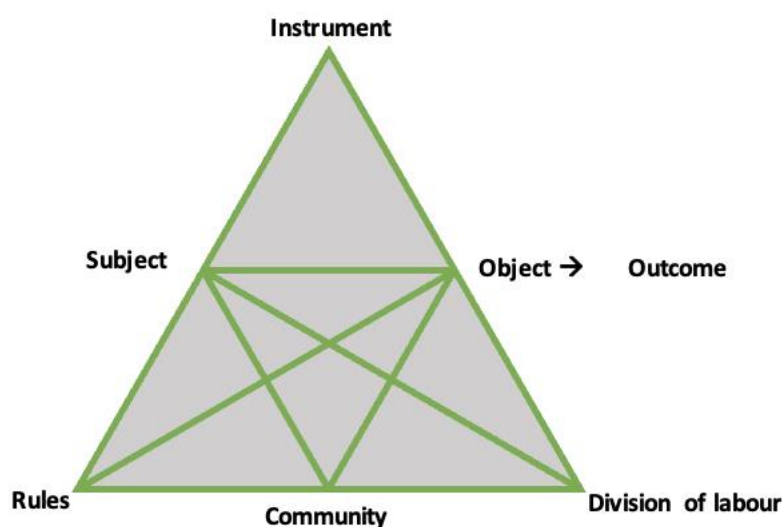
Figure 1: Engeström third generation AT triangular system (Engeström, 2001)

The "object" in an activity is the central focus guiding human agents' efforts to achieve specific goals within a culturally defined framework (Engeström, 2001). This object serves as a motivating and organising force driving the activity's progression (Kaptelinin, 2005; Nicolini et al., 2012). To improve goal achievement, individuals use cognitive and physical "tools" (Blackler, 1993; Engeström, 1995), which draw from accumulated experience and skills while aligning with their capacities (Kuutti, 1995). Therefore, the success of human activity hinges on the availability and suitability of these material or symbolic artifacts.

Engeström (1987) expanded the foundational triangular model of human activity by introducing community, division of labour, rules, and norms, emphasising their interplay within activity systems. This framework highlights that human activity involves more than just subject, object, and tools. Engeström underscores that a community, with varied motivations, rules, norms, and labour divisions, emerges around the object, mediating between the subject and the broader community. This approach acknowledges the conflictual nature of human activity, marked by ambiguity, interpretation, sense-making, and potential for change (Engeström, 2001).

This extension of AT reveals how complex work systems evolve, viewing activities as networks of interacting systems (Blackler et al., 2000). These activities are open systems, capable of adopting external elements or being influenced by related systems. New mediating artifacts may emerge from the community or through related activities, potentially introducing contradictions. These contradictions, tensions within or between elements or activities, challenge objectives and create instability. While problematic, contradictions also prompt opportunities for change, driving collaborative efforts towards evolution (Allen et al., 2013).

Contradictions fuel human progress (Engeström, 2001), where stability is rare, and disruptions and innovations are commonplace (Cole and Engeström, 1993). Development involves iteratively altering elements within activity systems to address emerging contradictions, often historically rooted. Culturally advanced systems evolve through these

transformations, fostering expansive learning cycles where objectives and motives broaden. Organisations adept at expansive transformations gain a competitive edge.

AT is instrumental in school transformations, offering a structured framework to analyse and improve educational processes. It promotes a holistic view of educational systems, encourages collaboration, and guides interventions for better teaching and learning practices. The study's framework involves flipped learning for out-of-class activities and active collaborative learning for in-class instructions, aiming to cultivate effective habits and skills. Flipped learning was used outside class, leveraging video lectures for new information and exercises targeting basic cognitive skills. Students assessed their understanding through self-reflection forms, using technology as a tool for autonomous knowledge construction beyond traditional homework assignments.

Incorporating flipped learning and structured collaborative learning rooted in socio-constructivist principles, this study aims to assess both the benefits and challenges of employing the flipped approach in pre-university education. It specifically focuses on its potential for positive learning outcomes and addressing any tensions revealed through the lens of AT.

Rationales of the Study

The goal is institution-wide adoption of FCM for transformative change. AT is pivotal for comprehensive analysis of educational processes, providing a structured approach to pinpoint contradictions, encourage collaboration, guide design, and align with educational objectives. This multi-layered approach empowers institutions to navigate complexities and improve teaching practices in today's dynamic educational setting.

Research Question

This study primarily focuses on a fundamental research inquiry: What contradictions arise during the implementation of FCM within the institution?

Methodology

i. Surveys and Participants

The study involved various participants: 860 Year 11 and Year 12 pre-university students completed the FCM questionnaire, while 108 teachers responded to one questionnaire about their experience, and 99 provided insights into their perceptions. Additionally, 164 parents shared their views on their children's blended learning experiences. Descriptive statistical analysis was used to uncover emerging themes from the surveys.

In addition, the research integrated semi-structured interviews involving 35 participants, comprising 25 students and 10 teachers selected through purposeful sampling criteria.

ii. Student Group Interviewees

Twenty-five students from Year 11 and 12 pre-university institutions were selected for interviews. The selection criteria for student participants included their experience with the FCM, academic performance and willingness to participate. Efforts were made to ensure

diversity among student participants, considering factors such as age, gender, and academic achievement.

iii. Teacher Group Interviewees

Ten teachers who were actively involved in implementing the FCM in various subjects were selected for interviews. Teacher participants were chosen based on their expertise in the subject matter, experience with the FCM, and willingness to contribute to the study. All participants provided informed consent, and their confidentiality and anonymity were rigorously maintained throughout the study. Pseudonyms were used to protect the identities of the participants in any study reports or publications.

Thematic analysis was employed to interpret and process the interview transcripts.

Results

By utilising Engeström's third-generation model of the activity system (2001), we analysed how goal-oriented actions are mediated by a wide array of pertinent factors, encompassing psychological, technical tools, and even social structures within the activity system for implementing FCM across the entire school. The activity system (Figure 2) is depicted below:
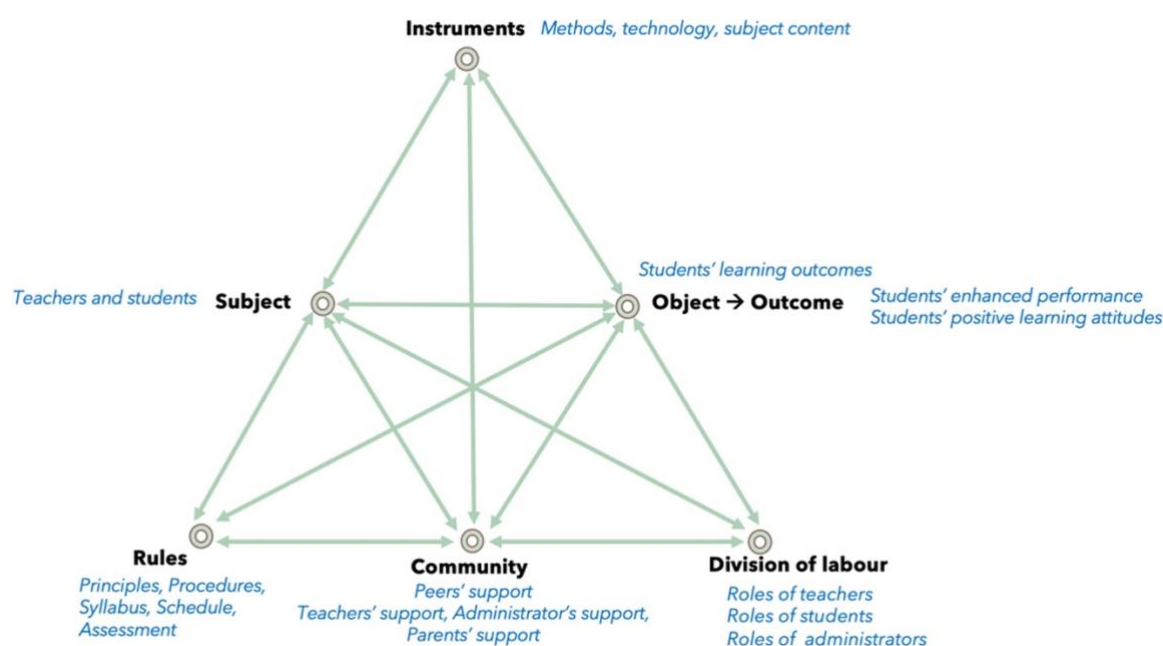
Figure 2: The activity system of FCM implementation in the pre-university institution

The survey results reveal a multitude of advantages associated with integrating the FCM at the activity level for both students and teachers. The implementation of FCM has yielded numerous benefits that significantly influence both students and teachers within the educational sphere. This innovative pedagogical approach has resulted in positive outcomes, particularly evident in terms of students' self-regulation, self-efficacy, independence, collaboration, and engagement (Table 1). FCM plays a crucial role in empowering students by enhancing their self-regulation skills. By transferring the responsibility of acquiring foundational knowledge to individual out-of-class preparation, students are encouraged to

oversee their own learning pace and style. This approach nurtures students' self-awareness regarding their learning needs and preferences, ultimately leading to enhanced self-regulation. This newfound autonomy not only equips students with essential skills for their academic journey but also for continuous learning throughout their lives.

Table 1: The emerged themes resulting from survey analyses

Instrument	Item	n	Quantitative	Emerged themes
Student's perception on FCM	34	860	Cronbach's α = 0.95	Self-regulation, self-efficacy, independence & collaboration among students
Tutors' perception on blended learning - FCM	19	108	Cronbach's α = 0.91	
Tutors' understanding of FCM	21	99	Cronbach's α = 0.97	
Parents' perceptions and experiences with FCM	28	164	Cronbach's α = 0.91	

Additionally, the FCM contributes significantly to the cultivation of students' self-efficacy. Within the dynamic learning environment shaped by FCM, where students actively participate in problem-solving and critical thinking exercises, a sense of competence and confidence in their academic abilities is instilled. As students successfully navigate complex content and tasks, their belief in their academic capabilities strengthens, potentially enhancing their overall academic performance. Moreover, FCM plays a pivotal role in fostering collaboration among students. In-class sessions often feature collaborative activities that encourage interactions among peers, promoting cooperative learning. These interactions facilitate the exchange of knowledge, diverse perspectives, and teamwork, thereby nurturing a sense of community and belonging among students. This collaborative approach not only enriches their learning journey but also prepares them for future collaborative efforts in professional settings.

Most importantly, FCM enhances student engagement. The interactive and participatory nature of flipped classrooms captures students' attention and enthusiasm. They are actively involved in discussions, problem-solving, and knowledge application during in-class sessions, which creates a dynamic and stimulating learning environment. This increased engagement can lead to heightened motivation and a deeper understanding of the subject matter. All in all, the integration of FCM presents significant advantages for both students and teachers, encompassing enhanced self-regulation, improved self-efficacy, boosted collaboration, and heightened engagement. These positive effects not only contribute to students' academic achievements but also equip them with essential skills and attitudes that extend beyond the classroom, shaping their future endeavours.

Affordances can be used as a valuable framework for generating interview questions, particularly in the context of educational research or when studying how individuals interact with specific environments or technologies. By identifying the specific affordances, we can explore valuable insights into how individuals perceive and interact with the features and possibilities offered by a particular environment, technology, or context. This approach can be especially useful in user experience research, educational research, and studies involving the evaluation of technologies or systems. It can also be a useful framework for identifying contradictions within an activity system. Contradictions in an activity system arise when

there are conflicts, tensions, or inconsistencies between different elements or components of the system. Affordances, which refer to the opportunities and possibilities that an environment or technology offers, can help pinpoint where these contradictions may occur. By identifying the specific affordances within the activity system to examine. These might be features or aspects of the system that are relevant to your research or analysis, assess how each identified affordance functions within the activity system and influences the actions, behaviours, or interactions of the participants. By using affordances (Table 2) as a lens to examine the interactions and relationships within an activity system, we can uncover contradictions that may affect the system's functionality, effectiveness, and the experiences of participants. Identifying and addressing these contradictions is essential for improving the design and implementation of the system.

The interview questions were carefully crafted to probe deeper into any contradictions or discrepancies that participants might have experienced. For instance, questions were framed to inquire about situations where students felt both highly engaged and, at times, disengaged within the FCM. Similarly, teachers were asked about moments when they observed students demonstrating self-regulation effectively and instances when they struggled with it. During the data analysis phase, researchers paid close attention to responses that indicated conflicting experiences, viewpoints, or challenges faced by participants. These discrepancies were noted as potential contradictions within the activity system of FCM implementation. Contradictions signify areas of tension, conflict, or inconsistency within the FCM's implementation and operation. Recognising these contradictions provides valuable insights into the complex dynamics at play within the educational setting. It allows educators and researchers to pinpoint challenges that students and teachers may face, facilitating the development of targeted solutions and interventions. Moreover, understanding contradictions helps refine the FCM's design and implementation, aligning it more effectively with educational objectives. By addressing these contradictions, educators can harness the full potential of FCM, enhancing its impact on students' self-regulation, self-efficacy, collaboration, and engagement. Therefore, the identification of contradictions is not merely a research endeavour; it is a strategic tool for refining and optimising the FCM to create a more conducive and effective learning environment. Based on interview data analysis, several contradictions were uncovered in the FCM activity system (Table 2).

By integrating this approach into the research process, the study aimed to not only highlight the affordances but also uncover and analyse the contradictions within the FCM activity system. This comprehensive examination provided a more nuanced understanding of how FCM impacted both students and teachers, encompassing both positive and challenging dimensions of the educational approach. Students' experiences with the FCM reveal several noteworthy affordances and contradictions within their activity system. The affordances corroborate the positive emerging themes from the survey outcomes. The contradictions, on the other hand, encompass challenges related to a heavier workload caused by FCM's out-of-class assignments, disparities in technology access and technical issues, difficulties in providing constructive feedback during peer assessment, the absence of immediate feedback during out-of-class activities, a preference for teacher-created video content over generic resources like YouTube, the need for precise instructions when assigning out of class tasks, struggles in adapting to the autonomy required for in-class active learning, and a tendency to focus on procedural learning for exam preparation rather than the desired conceptual understanding. These contradictions underscore the need for careful consideration and adjustments when implementing FCM to ensure its effectiveness in fostering student learning outcomes.

Table 2: Thematic analysis of students' affordances and contradictions on FCM

Theme	Students' Learning	Affordances	Contradictions
Active learning	Organisation	Students generally have a positive attitude and are open to both out-of-class and in-class tasks and activities.	Students unable to complete out-of-class task due to a busy schedule with other subjects and extracurricular activities.
	Engagement	Clear lesson objectives in FCM tasks ensure students actively participate.	No specific contradictions in this area.
	Independence/ Initiative	Students show independent learning behaviors when they can watch videos at their own pace and take the initiative to do additional research and make notes or summaries.	Some responses show that students need the teacher's guidance or feedback right away during out-of-class activities.
Student-centered learning	Collaboration	Students have a very positive attitude toward group activities, provided everyone shares the responsibility for completing the task. They mentioned that their speaking skills and confidence have improved, leading to more interactions with both peers and the teacher, who acts as a facilitator.	Most responses pointed out that group members did not contribute equally. Others mentioned they could not give helpful feedback during peer assessment.
Integration of ICT in learning	Use of ICT	Students have a positive attitude toward using technology in education. Different tech tools have been used for both at-home and in-class activities to encourage independent and group learning.	Some students mentioned problems with internet connections, data costs, and not having enough devices as their main challenges.
Effective use of resources	Use of resources	Students' responses show that the out-of-class task was used well and improved their understanding of the topic. They also mentioned how this gave them more time for meaningful learning in class.	Some students said teachers should give shorter videos and clear instructions for homework. They like when teachers made their own videos rather than using YouTube.

Teachers' Activity Contradictions

The activity system of teachers implementing the FCM reveals several notable contradictions (Table 3). Firstly, there is a contradiction related to the increased workload associated with designing a flipped class. While FCM aims to optimise learning, teachers find themselves

dedicating more time and effort to create suitable flipped materials, including videos and interactive activities. This increased workload can be at odds with the goal of reducing teachers' burdens.

Table 3: Thematic analysis of teachers' contradictions on FCM

Theme	Contradictions
Increase in workload	Responses show that making flipped learning materials takes a lot of time. Teachers struggle to find or make videos that match their lessons. Designing in-class activities, resources, and tests that fit FCM and TPA criteria is hard and stressful for teachers. Some students need extra supervision to finish their out-of-class work, which makes teachers' work even busier.
Accessibility of technology and other technological issues	Responses show that only a few students have these issues.
Lack digital competence	All interviewed teachers show strong digital skills, with some even conducting training for other departments on teaching apps. However, according to their feedback, many teachers lack the digital competence needed for effective integration of ICT in the flipped classroom.
Lack understanding of FCM (based on one of the 4 pillars of flipped learning)	Teachers expressed concerns about the need to use exam-style questions/resources to maximise curriculum time, which may not be suitable for the flipped classroom.
	Some teachers may not fully understand how to prepare 'intentional content' for in-class activities, where students are expected to apply learned concepts and engage creatively to build new knowledge.

In addition, there is a significant contradiction concerning teachers' digital competence. While some educators demonstrate proficiency in using digital tools and resources, others lack the necessary skills to effectively incorporate technology into their FCM lessons. This contradiction highlights the need for ongoing professional development to ensure that all teachers can leverage technology to enhance their teaching. Another contradiction emerges in terms of accessibility and technological issues. Teachers may assume that students have equal access to technology, but this is not always the case. Variations in students' access to devices and internet connectivity can hinder the successful implementation of FCM, leading to unequal learning opportunities.

Furthermore, there is a contradiction related to teachers' pedagogical knowledge. Some educators may not possess up-to-date pedagogical knowledge, particularly regarding student-centered approaches like FCM. This discrepancy can result in inconsistent instructional practices. A lack of understanding of FCM among teachers is another contradiction. Some educators may not fully grasp the principles and benefits of this pedagogical approach, which can lead to resistance or sub-optimal implementation.

Lastly, there is a contradiction tied to the prevalent exam-oriented mentality among teachers. While FCM encourages a shift towards conceptual learning and active engagement, teachers entrenched in exam-focused teaching methods may struggle to align their practices with

FCM's objectives. Table 4 provides a summary of the primary contradictions identified among teachers and students within the institution. These contradictions highlight the need for a shift in teachers' and students' mindsets and priorities regarding educational outcomes.

Table 4: Main contradictions of students' and teachers' on FCM

Student	Teacher
Heavier workload	Heavier workload to design a flipped class.
Accessibility of technology/ technological issues	Lack of digital competence.
Inability to provide constructive feedback during peer-assessment	Accessibility of technology/ technological issues (students).
No access to immediate feedback during out-of-class activities.	Lack of current pedagogical knowledge
Preference for teacher-made video lectures instead of YouTube videos.	Lack understanding of FCM
Need for specific instructions when assigning out-of-class activities	Exam-oriented mentality
Inability to meet higher demand in self-discipline and structure to prepare for in-class active learning	
Focus on procedural learning for exam preparation contrary to teacher's desire to elicit conceptual learning	

Discursive Manifestations of Contradictions

Conducting a discursive manifestation analysis and classifying interview excerpts of contradictions into dilemmas, critical conflicts, or conflicts involves a systematic approach to understanding the contradictions and tensions within the discourse. In this study, the discursive manifestation of contradictions that unfold can be categorised into either dilemma, critical conflict or conflict.

When asked if the FCM is suitable for A-Level subjects, it became apparent that both students and teachers were skeptical of its appropriateness. Here are some excerpts of teachers and students' responses to FCM that indicate contradictions that exist in FCM activity system:

- In response to question (*What do you think of the FCM preparation?*)

> "*It's time consuming, because you have to figure out the topic, content and then the script (for the lecture videos) and then you have to figure out the in-class activities.*" – Teacher A

> "*Sometimes we would be assigned more a lot of videos, which were mostly short videos, and the deadlines are on the same day, so sometimes, I'll get overwhelmed. After school, I may also have other priorities, or I may not be home at the moment. And at times, the videos are assigned quite late.*" – Student B

"*Selecting the right video, with the right topic and duration is very tough and takes up time but I also get support from my departmental PD.*" – Teacher D

"*It'll be easier for the, to prepare notes for the traditional compared to the flip classroom because for the flip classroom, you don't want to tell everything. You don't want to give all the content because you want to use the content during the flip classroom.*" – Teacher C

"*A-levels are rigorous and time-bound. There's not much room for experimentation and implementing FCM effectively while meeting the curriculum's demands can be a real challenge.*" – Teacher E

"Sometimes I procrastinate so the work piles up. Also I have essay-based subjects so it does pile up and I do get overwhelmed to do everything so like I couldn't do some of the subjects." – Student H

- In response to question *("Some people do not like to work with technology. Do you have this kind of feeling? Did you encounter any problems using the technology")*

"*It depends on the teacher also, if they are not innovative or tech-savvy so they will not use ICT.*" – Teacher C

"*Lack of knowledge of the use of the apps, perhaps. 'cause not, not all of the teachers are knowledgeable to use one particular app. I myself have to teach my, my colleagues as well to use the Class Point app.*" – Teacher A

"*One of the challenges I faced was the internet connection or maybe not enough data.*" – Student L

- In response to question *("Do you think the FCM aligns with the teaching approach expected of the A-level curriculum?")*

"*I don't believe so, yeah. I, I, because I believe, I believe in chalk and talk and, and once the syllabus is done, like over the past few years we've been doing this over the past, I've been doing this for the past few years. Once the finish of the syllabus, uh, is completed, um, we do a drilling method. Okay. Yeah. Meaning we, we, we really drill the students, we do the past papers, and it works. It works and it helps the students, uh, the lower operator students to, um, to at least get a pass. Okay. At least get a pass.*" – Teacher A

"*I prefer using traditional methods because it allows me to complete as some time, uh, which gives, which gives me more time to do, um, to do more of the past papers with, uh, to do revision with the students. So, when you finish the syllabus on time or even before that, you have more time to do past papers with the students.*" – Teacher D

Interview transcripts offer rich insights into conflicts, dilemmas, and critical conflicts. Participants express inner conflicts and uncertainties through spoken words, revealing dilemmas as they weigh pros and cons and critical conflicts when deep contradictions emerge. Both overt and subtle conflicts are discernible from their language, tone, and non-

verbal cues, showcasing differing viewpoints. These transcripts capture nuances, offering insights into decision-making, disagreement, and conflict resolution. Table 5 outlines the verbal expressions evident in discussions with students and teachers, showcasing emerging discursive manifestations.

Table 5: Main contradictions of students' and teachers' on FCM

Issue/contradiction	Manifestation
Disagreement over pedagogy	Dilemma A
Desire for autonomy over teaching preference	Dilemma B
Preference for teacher-made video lectures instead of YouTube videos.	Dilemma C
Different expectation over the division of labour between teachers and students (students' autonomy vs teachers' guidance during out-of-class)	Critical conflict A
Unwilling to see beyond the exam and spending time on FCM	Critical conflict B
Inadequate instructions to facilitate students' completing the out-of-class tasks autonomously	Conflict A
The nature of A-level course	Conflict B

Mapping contradictions into the triangular activity system of AT can help visualise how these tensions affect different components of the activity system (Figure 3).
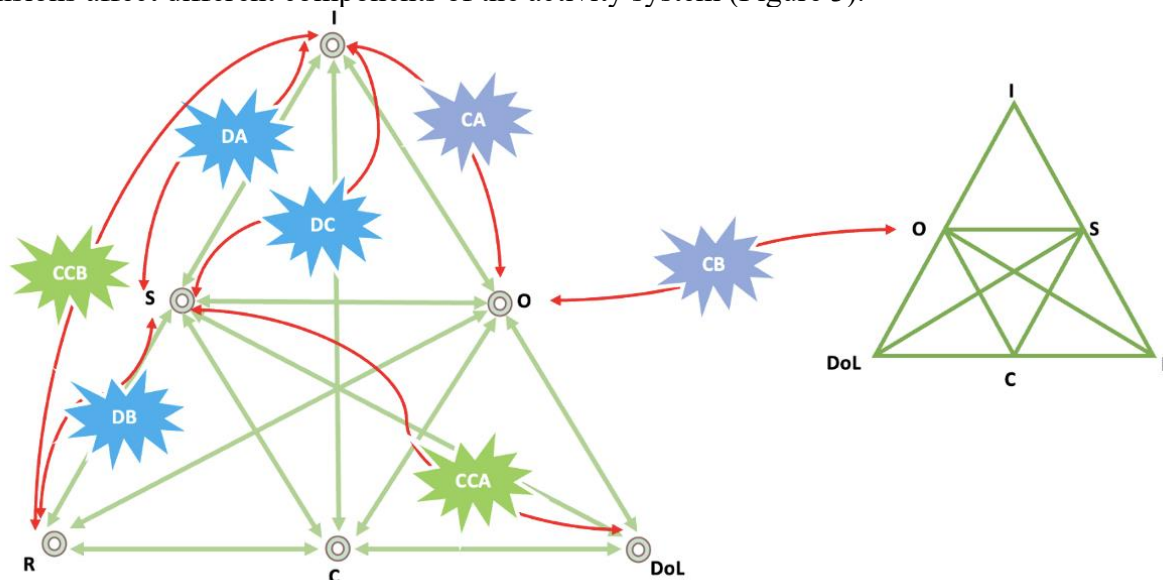
Figure 3: Mapped contradictions in the FCM activity system. Dilemma A (DA), Dilemma B (DB), Dilemma C (DC), Critical Conflict A (CCA), Critical Conflict B (CCB), Conflict A (CA), Conflict B (CB)

Mapping contradictions into the triangular activity system can provide a structured way to visualise and analyse the complex interplay of tensions within the FCM context. It can gain

insights into how these contradictions affect different aspects of the teaching and learning process and inform strategies for resolving or managing them effectively. This framework offers a visual representation of the interplay between various elements involved in teaching and learning, including the subject (teachers and students), the object (learning objectives), and the mediating tools and rules (technology, curriculum, pedagogical approaches). When contradictions emerge, they often involve these elements, and mapping them onto the triangular activity system elucidates their interactions.

By doing so, it becomes possible to identify the specific areas within the FCM environment that are most affected by these tensions. For example, if a contradiction relates to students' self-regulation, it may primarily impact the subject (students) and their capacity to manage independent learning. Conversely, contradictions concerning technology access may directly influence both the subject (teachers and students) and the tools (technology). This visual representation helps educators and researchers understand the focal points of each contradiction, facilitating targeted interventions and solutions.

Understanding how contradictions manifest within this framework informs the development of strategies to effectively address or manage these tensions. For instance, if a contradiction is rooted in students' difficulties with self-discipline during out-of-class activities, educators can use this insight to design interventions that support students in developing better self-regulation skills. Likewise, if technological access poses a challenge, educators can explore ways to enhance accessibility or provide alternative resources. Mapping contradictions into the triangular activity system encourages a holistic perspective of the educational ecosystem. It underscores that tensions within one element of the system can have ripple effects throughout the entire FCM, impacting other components. This holistic viewpoint encourages comprehensive and integrated solutions, moving away from isolated fixes for individual issues.

Ultimately, this approach supports continuous improvement within FCM. By identifying and addressing these tensions, institutions and educators can adapt and enhance their FCM implementations over time, making it a more effective and responsive approach to teaching and learning. These discursive manifestations reflect the nuanced interactions and perspectives within the FCM context, highlighting the need for a comprehensive understanding of these contradictions to develop effective strategies and solutions. Addressing these tensions might facilitate a more unified and efficient assimilation of FCM within the pre-university institution, mirroring the successful practices adopted by this establishment. Consequently, this approach has shown promising outcomes in students' learning achievements, attitudes, and teachers' professional practices. This is evident from the positive outcomes within the activity system following the completion of three full terms of comprehensive whole-school implementation of FCM at the institution.

Conclusion

In summary, this research strongly supports the positive impact of FCM on students' learning attitudes and essential 21st-century skills. FCM fosters self-regulation, collaboration, independence, and heightened engagement, contributing to successful educational experiences. It encourages active participation, critical thinking, and aligns with modern learning approaches. However, it reveals contradictions at student and teacher levels, necessitating collaborative efforts to address these challenges. Contradictions within FCM should guide a more effective, student-centered approach rather than being seen as barriers.

This study provides insights for refining FCM implementation, leveraging AT to address diverse elements like students, teachers, technology, and socio-cultural contexts. AT's adaptability for longitudinal studies aids in tracking changes and interventions, making it vital for educational research and reform efforts. Overall, these findings endorse FCM as a transformative teaching method amid evolving educational landscapes.

Acknowledgements

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Construction of Instructional Design Model Using Picture Books on Children With Specific Language Impairment

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Abstract

Compared with ordinary children, children with specific language impairment (SLI) have delayed language development, poor reading comprehension, and greater difficulties in learning. This study tested 5 SLI children at a primary school in northern Jiangsu Province in China in the last two years. This study aimed to develop and implement an instructional design model for SLI English learners using picture books. The instructional model was developed through three stages. In the first stage, a literature review of the progress, challenges, and prospects of the Intervention of picture books on SLI children was conducted, and the results were integrated into the design of the instructional model. In the second stage, the results of the first stage, the instructional model, were evaluated and revised by expert review and interview. At the last stage, after the results of the previous stages were integrated, the final instructional model using picture books for SLI children's instructional design practice was developed. Using picture books, the instructional design model emphasizes SLI children's language learning motivation and understanding activities and systematically integrated experience-learn-apply-reflect-revise activities and language expression and interaction activities through all stages.

Keywords: Picture Book, Specific Language Impairment (SLI), Interaction Activities, Authentic Learning

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Introduction

English Language Learning (ESL) poses unique challenges for children with Specific Language Impairment (SLI). These challenges demand innovative and effective instructional approaches. One such method of gaining recognition is the use of picture books. This essay explores the significance of picture book instruction in ESL for children with SLI, emphasizing its benefits, strategies, and potential impact on language development. This study aimed to develop and implement an instructional design model for SLI English learners using picture books.

It is crucial to grasp the nature of SLI to comprehend the implications of TEFL for SLI children. SLI is a developmental language disorder characterized by difficulties acquiring language skills despite normal hearing and intelligence. These challenges extend to second language acquisition, making TEFL instruction particularly complex for this population.Picture books provide visual support, aiding in comprehension. For SLI children, visuals can serve as a bridge to understanding, making it easier to grasp the meaning of words and sentences. Exposure to diverse vocabulary is essential for TEFL learners. Picture books offer a rich source of words in context, facilitating vocabulary development in a more engaging and memorable manner. Well-crafted sentences in picture books contribute to the understanding of English sentence structure and grammar. By presenting grammatically correct language in context, children with SLI can better internalize language rules. Many picture books follow a narrative structure, helping SLI children understand story organization. This not only enhances their storytelling abilities but also improves overall comprehension skills.

Selecting suitable picture books is crucial. Opt for those with clear illustrations, simple language, and themes that resonate with the children. Consider the cultural background and experiences of the learners to ensure relevance. Engage children actively during reading sessions. Encourage them to express their thoughts, ask questions, and make predictions. This interactive approach fosters language development and communication skills. Design activities that target vocabulary acquisition. For example, create word cards from the book's content, play word games, or have discussions about the meanings of specific words. After reading, encourage SLI children to retell the story in their own words. This enhances their ability to sequence events and reinforces comprehension. Appeal to various senses by incorporating multisensory elements. Use props, gestures, or interactive games related to the story, providing a holistic learning experience.

An important prerequisite for conducting research on children with SLI is to clarify the symptoms of their language impairment deficits. Only on this basis can it be possible to determine its cause and then propose an intervention or correction plan. However, there are large differences in the language impairment performance of children with different language SLI. Firstly, the most pronounced language deficits in children with SLI are morphological-syntactic problems, and their language problems vary from language to language. For example, the use of tense can be used as a clinical sign for the diagnosis of English SLI children. English SLI children will have difficulties in expressing third-person singular -s, be verbs, auxiliary verbs, etc. when using sentences (Rice & Wexler, 1996), and it is difficult to use accurately The position of -ed in the past tense of verbs and specific usage rules(Dalal & Loeb, 2005). German SLI children have expression problems in the use of subject-verb agreement, mainly in the first, second and third person singular forms of transitive verbs, and the accuracy of understanding the object beginning declarative sentences

is relatively low (Stegenwallner-Schuetz & Adani, 2021). In the processing of relative clauses, Korean SLI children have lower accuracy in offline comprehension tasks of clauses and lower efficiency in online processing tasks(Yoo & Yim, 2021). However, the main problem of Spanish and Italian SLI children is not the tense, but the obvious expression problems in the use of articles and direct object attachment forms, and the obvious delay in comprehension compared with ordinary children(Bedore & Leonard, 2005). Japanese SLI children misexpressed the continuum of pronouns and adjectives when understanding relative clauses(Sasaki, Schwartz, Hisano, & Suzuki, 2021).

Picture books often explore emotions and social situations. Use these stories as a springboard for discussing feelings, social interactions, and appropriate language use. Picture book contributes to both language and emotional development. Foster a sense of community and collaboration through group activities related to the picture book. Picture books improve language skills and enhance social communication and teamwork.

Recognize the unique needs of each child with SLI. Tailor picture book activities to address specific language challenges, providing individualized support. ESL instruction can be daunting for SLI children. With their visual support and interactive nature, picture books create a low-pressure environment that boosts confidence and encourages participation.

The Design

There are 11 children aged 8-9 participated in this study, including 5 SLI kids and 6 TD kids from a typical primary school in Xuzhou, Jiangsu Province in China. The picture book was selected according to those kid's pre-tests by TOEFL Primary sample tests. The TOEFL Primary Step 1 pre-test scores were converted to Lexile Levels for picture book selection. This score conversion used a converting scale provided by the English Test Service (ETS).

The procedure proceeded with a brief, authentic, interactive activity with the kids. After the introduction activities, the teacher and kids played with the book in a situated context. Using picture books, the instructional design model emphasizes language learning motivation and understanding activities systematically integrated experience-learn-apply-reflect-revise activities, language expression, and interaction activities throughout all stages for SLI children.

Conclusion

In conclusion, picture book instruction holds immense potential for enhancing ESL learning for children with Specific Language Impairment. Educators can create a supportive and effective language learning environment by addressing the unique needs of SLI learners and capitalizing on the visual and interactive aspects of picture books. The strategies outlined in this essay serve as a foundation for developing tailored ESL programs that cater to the diverse linguistic needs of SLI children, fostering language development and a love for learning. As research in this field continues to evolve, educators can refine and expand these strategies to further optimize ESL instruction for children with SLI.

Acknowledgements

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Surveillance on College Students' Experiences During Online Modality: Towards an Independent Learning Approach

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Abstract

With the COVID-19 pandemic that resulted in lockdowns in the Philippines starting in March 2020, learning had to be immediately shifted to an online modality, a setup where students studied mostly on their own forcing them to become independent learners. Using descriptive phenomenology by Paul Colaizzi as a research design, the study investigated the lived experiences of college students under the online learning modality during the COVID-19 pandemic. Through in-depth interviews, data was gathered from (15) full-time third-year college students during the Second Semester of the Academic Year 2022-2023 at a Philippine higher education institution. Findings showed that participants mostly describe independent learning as "learning on your own" or "self-study". As a result of learning alone during the pandemic, they were able to develop independent learning skills and capabilities such as flexibility and adaptation, self-reflection and continuous improvement, openness to new perspectives, resourcefulness and self-reliance, and setting goals and measuring progress. Results further revealed that students became resilient; they were able to adapt to the new learning setup and found ways to learn on their own to survive or thrive in the new learning setup despite the difficulties during the COVID-19 pandemic. Recommendations included promoting independent learning through explicitly creating a policy and incorporating it into the curriculum, pedagogy, assessment, and support service programs of the university, to fully realize the potential of students to become independent learners.

Keywords: Independent Learning, Lived Experiences, COVID-19 Pandemic, Online Modality

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Introduction

The COVID-19 pandemic has radically changed the educational landscape. The Philippines faced a critical situation due to the said health crisis. For higher education institutions, avoiding and limiting the risks of infection in the academic community has become a primordial concern. Hence, with the implementation of community quarantine, the conduct of classes needed to be immediately suspended. The herculean challenge then was how to continue teaching and learning beyond the usual face-to-face instruction.

Even before the pandemic, several higher education institutions (HEIs) in the Philippines had already started using the blended learning modality which is a combination of face-to-face and online learning through a Learning Management System (LMS). Most universities had to immediately shift to full online learning when lockdown was declared in March 2020 (2nd Semester, Academic Year 2019-2020).

Whether flexible learning was done online or using printed modules, the reality that confronted students was that they had to become independent learners – they had to go through their modules independently, now the teacher becoming a facilitator rather than the transmitter of knowledge.

A literature review done by the researcher revealed that there have been many studies conducted about independent learning but most of them were done in Western countries and very few in the Philippine setting. This may be attributed to online learning being something new in the Philippines. In addition, no study yet has been conducted on independent learning in the Philippines at the time of the COVID-19 pandemic. With online learning as the new norm, independent learning must be a primary competency of students.

Purpose of the Study

The purpose of the study was to explore the experiences of college students on independent learning under the online learning modality during the COVID-19 pandemic. Specifically, the study intended to answer the following: 1) How do the participants describe independent learning? 2) What are the lived experiences of college students on independent learning in the online modality? 3) What program and strategies can the university adapt to develop independent learning among students?

The study focused on the experiences of students with independent learning through online modality during the COVID-19 pandemic. It was conducted in the Lyceum of the Philippines University Manila among fifteen (15) full-time third year level students. Three (3) participants were chosen from each of the following colleges: College of Arts and Sciences, College of Business Administration, College of International Relations, College of International Tourism and Hospitality Management, and College of Technology. Third year students were chosen because they experienced the first year of fully online learning in LPU Manila that was implemented effective AY 2020-2021. Nine (9) female students and six (6) male students participated in the research.

Methodology

The study utilized qualitative research design, particularly, descriptive phenomenology using an in-depth interview instrument to gather data from the participants. Colaizzi's approach to descriptive phenomenological analysis was used.

Ethical practices were exercised, and a data management plan was in place to ensure that data privacy was preserved. The research protocol was submitted to the Philippine Social Science Council-Social Science Ethics Review Board (PSSC-SSERB) for review and approval. The study was conducted only after approval of the said body.

Conclusion

Findings

The participants mostly describe independent learning as "learning on your own", "self-study", "learning to come from your own initiative", "having your own learning time or learning pace", "learning with little or no guidance" or "without the help of professors or teachers". These are consistent with earlier definitions of independent learning as gathered by the researcher.

Aside from self-organization, there is also a component of independent learning where the teacher does not play a central role in the learning process (Scheel et al., 2022). According to Moore (1973), independent learning and teaching constitute an educational approach where the learner operates autonomously, separated from the teacher by space and time, with communication occurring through print, electronic, or other non-human mediums (p. 663). This learning approach requires students to be active and independent in their learning. It focuses on student-centered learning, where students are encouraged to seek new knowledge on their own without being guided by others. This ability to learn independently is known as self-directed learning.

Based on the results of the study, students during the pandemic were forced to learn on their own. Thus, we can conclude that the online learning environment may have served as the driver for the development of independent learning skills among students. This also suggests that students became resilient; they were able to adapt to the new learning setup and found ways to learn on their own to survive or thrive in the new learning setup despite the difficulties brought about by the COVID-19 pandemic.

Five themes emerged as a result of the study - flexibility and adaptation, self-reflection and continuous improvement, openness to new perspectives, resourcefulness and self-reliance, and setting goals and measuring progress.

1.   Flexibility and Adaptation

Students often face changing circumstances, such as shifting from traditional classroom settings to online or self-paced learning. Independent learners demonstrate flexibility by adjusting their study routines, adopting new technologies or platforms, and embracing alternative methods of learning. They adapt their strategies and approaches to accommodate different learning environments and make the most out of the available resources.

Participant A stated that:

> "...We were mostly doing modules asynchronously, so basically the professors would explain to us that we need to study the modules on our own given that the synchronous classes are very limited."

Participant B stated that:

> "it was online and we had to adapt to the new way of learning. So, we did not have any choice. If we will not adapt, we will be left behind."

In independent learning, there is a shift in power dynamics between the teacher and the learner, favoring the learner (Chene, 1983). Additionally, the student must independently strive to solve problems (Abrosimova, 2020), and the ability to learn without direct teacher support is crucial for academic success, particularly in digital learning environments (Scheel et al., 2022). Digital learning necessitates a higher level of motivation and persistence, as learners must take greater responsibility for their learning process compared to face-to-face learning with direct instructions from a teacher (Yunusa & Umar, 2021).

2.   *Self-reflection and Continuous Improvement*

Independent learners engage in self-reflection to assess their progress, identify areas for improvement, and make necessary adjustments to their learning strategies. They actively seek feedback, evaluate their strengths and weaknesses, and use this self-awareness to refine their study habits and approaches. They are committed to continuous improvement and strive to enhance their learning experience by reflecting on their achievements and areas for growth.

Participant I mentioned that:

> "one [learning] strategy that I learned from a friend is the Microsoft To Do List. I downloaded this to-do list, an app where I could input my schedules and deadlines and it will remind me. Another strategy that I found effective is comparing notes and ideas with friends or classmates."

Participant J also utilized the Microsoft To Do List by stating that:

> "[the feature was] effective for me because during the pandemic it was very hard to go to bookstores to get highlighters and post-its materials."

Self-reflection has been a key aspect of this process. As students engage in independent learning, they must assess their strengths, weaknesses, and areas for growth. By reflecting on their progress and learning experiences, they can identify what strategies work best for them and what needs improvement.

Participant G stated that:

> "I realized that I am privileged in the sense that I had a lot of time to study during the online setup. So, I was able to set goals like I made sure to recite every meeting, participate in class activities, and pass academic requirements on time."

Participant H mentioned that:

> *"I became keener on learning. I like learning something new. So, every time I encounter something, I become curious, so I try to verify or read about it some more."*

Relatedly, Participant K suggested that:

> *"I am getting better at balancing everything out, like with time management and the quality of my work."*

Participant A also stated that:

> *"The basic skills needed for learning on your own are time management and self-discipline. These are the key factors for independent learning."*

Continuous improvement is also vital during this time. As the pandemic pushed students to learn independently, they had the chance to refine their study habits, time management skills, and approaches to learning new concepts. By consistently seeking ways to enhance their learning process, they can adapt and thrive in this new educational landscape. Furthermore, independent learning has brought about the importance of resilience and adaptability in the face of uncertainty. Independent learning has allowed the students to develop a growth mindset, enabling them to embrace challenges and view setbacks as opportunities for learning and improvement.

3.   *Openness to New Perspectives*

Independent learners embrace diverse viewpoints and perspectives, recognizing the value of learning from others. They actively engage with different sources of knowledge, collaborate with peers, participate in online forums, or seek mentorship to broaden their understanding and gain new insights. They remain open-minded and receptive to alternative viewpoints, promoting intellectual growth and expanding their horizons.

Participant L shared a similar sentiment by stating that:

> *"the pandemic has taught us many things, not only about lessons learned in the classroom but outside LPU as well."*

This coincides with a study conducted by Zhu et al. (2022). The focus of the research was on investigating the behavioral intentions of 193 university students regarding online learning before, during, and after the COVID-19 lockdown. The findings revealed a significant increase in students' inclination to engage in online learning during the COVID-19 pandemic, therefore increasing their academic performance.

Participant G stated that:

> *"Sometimes I ask my siblings when it comes to some topics that I cannot understand, or I ask them to check my grammar."*

Participant F stated that:

> *"My interactions with my classmates also contributed to a deeper understanding of our lessons because we share our thoughts with each other."*

4.　Resourcefulness and Self-reliance

Independent learners develop resourcefulness and self-reliance as they navigate their learning journey. They take the initiative in seeking out learning resources, such as online materials, books, and research papers, to supplement their knowledge. They leverage their problem-solving skills and creativity to find solutions to challenges they encounter along the way. They become self-reliant by taking ownership of their learning process and actively seeking opportunities for self-guided exploration.

Participant C stated that:

> *"I also learned to rely on my own and explore on my own as we could not rely 100% on our teachers. I also realized that I needed to exert extra effort. Those extra efforts paid off as my grades went higher."*

Participant F stated that:

> *"I usually used the desktop for my online classes, and I have another device, my cellphone, to take down notes or take pictures of the lecture slides."*

Participant F stated that*:*

> *"What I did during the online modality was to open my Mrooms, read and try to understand what I was reading and listed down keywords so I can easily recall them, and the concepts associated with these keywords."*

Participant H stated that:

> *"In my field, computer science, not all learnings are taught in the classroom, so you have to be resourceful enough. What I do is take free online courses."*

Participant G stated that:

> *"I think the initiative to learn on my own happened because communication was difficult during the pandemic. So, what I did was do further research on the topics or lessons."*

5.　Setting Goals and Measuring Progress

Research by Locke and Latham (2002) emphasizes the significance of setting short-term goals as they provide immediate direction, focus, and motivation. Short-term goals act as building blocks towards long-term objectives, facilitating progress and boosting self-efficacy. Additionally, studies suggest that individuals who regularly set and achieve short-term goals experience increased productivity, satisfaction, and overall well-being (Grant & Dweck, 2003; Oettingen, 2012).

As reiterated by Participant K:

> *"I think when I look at the deadline given by my professor, I would say my goal is to accomplish this a day before…"*

Gollwitzer's research on implementation intentions highlights the power of linking specific actions to goal attainment (Gollwitzer & Sheeran, 2006). By forming if-then plans, students may enhance their commitment to goal pursuit and overcome potential obstacles. Implementation intentions promote proactive behavior, increase self-control, and improve the likelihood of successful goal achievement.

Participant D admitted that their *"goal is to be productive every day, so I make sure to finish today what needs to be done today or to be submitted tomorrow."*

Likewise, Participant F stated that:

> *"I set a goal that every day, I accomplish or finish something, like one activity so my things to do will not pile up. And if there is free time, I do self-reading. I also allot time for rest and prepare myself for the next set of requirements or readings."*

While short-term goal setting is widely regarded as a beneficial practice, it is essential to explore the potential negatives associated with this approach. Setting overly ambitious or unrealistic short-term goals can lead to increased stress, pressure, and burnout (Locke & Latham, 2002). When individuals continuously strive for immediate results and push themselves relentlessly, they may experience physical and mental exhaustion, decreased motivation, and decreased well-being.

This may also be realized in the statements by Participant L by sharing that:

> *"I set a high standard and I always do SWOT analyses of problems, concerns, and projects. This is my way of knowing whether a certain project or activity that I need to undertake is feasible and what things I need to prepare. There were realizations that there are still things that I do not know or things that I needed to learn."*

Participant E stated that:

> *"I set goals in the long term and always take into consideration how it will benefit more people, not just for me, but for the community."*

Perfectionism, characterized by setting excessively high standards and a tendency to self-criticize, is often associated with unrealistic expectations (Hewitt & Flett, 2004). Research suggests that perfectionistic tendencies can contribute to burnout, as individuals may engage in relentless striving for flawlessness and experience distress when unable to meet their self-imposed standards (Stoeber & Otto, 2006). Perfectionism can intensify the negative effects of unrealistic expectations on well-being and increase the risk of burnout.

Participant A shared that:

> *"I realized that when it comes to learning goals, I set them high. I think I am a perfectionist. I would like to have a high position in a hotel later so I strive to perform well in my academics and graduate with Latin honors."*

Similarly, Participant H whose way of setting goals *"is that I aim for the best results. I am a bit of a perfectionist. I do not stop until I am satisfied with the results. I am bothered if I am not satisfied with the results."*

This may coincide with research that have shown a strong association between perfectionism and the presence of unrealistic expectations (Stoeber & Otto, 2006). Perfectionistic individuals tend to set impossibly high standards for themselves and others, leading to unrealistic expectations of achievement and performance. Unrealistic expectations often stem from the fear of failure, the need for external validation, and a desire to meet unattainable ideals.

> *"I set high goals when it comes to my grades and when it comes to my academic work. For example, I set high expectations for papers or reports. Let us say, something is difficult to produce, like posters or infographics. I go through them a lot of times and I ask other people to critique my work,"*

as stated by Participant E.

Monitoring progress is essential for goal attainment. Research suggests that regularly tracking and reviewing progress toward short-term goals enhances self-awareness, motivation, and self-regulation (Carver & Scheier, 1990; Kanfer & Ackerman, 2004). Additionally, receiving feedback, whether self-generated or from others, helps individuals assess their performance, adjust strategies, and stay on track (Locke & Latham, 2006).

Such were the responses by Participant B, who stated that *"I monitor my grades on quizzes, and I ask my teachers during consultation regarding the results of the assessment, especially areas where I did not do well or areas for improvement."*

Research suggests that monitoring progress enhances goal achievement by increasing self-awareness and providing a sense of control (Carver & Scheier, 1990). Regularly tracking progress allows individuals to assess their performance, identify areas for improvement, and make necessary adjustments. It also helps individuals stay motivated and maintain focus on their goals (Wulfert, 2018).

As observed from most of the responses of the students, they are able to set short-term goals like getting good grades, being able to comply with the requirements of the course/subject, or being able to meet deadlines given by their teachers.

There are also goals that pertain to achieving high academic standards like setting high expectations for academic outputs, getting good grades or to be in the dean's list, aiming for best results, or to be among the best students in class. However, some of these need to be SMART (specific, measurable, attainable, realistic and time-bound) so that the desired outcomes of a goal will be achieved.

Implications to Pedagogy

To fully realize the potential of students to become independent learners, the researcher recommends that the university to actively promote and support independent learning through a directed independent learning (DIL) approach wherein independent learning is explicit as a policy goal and incorporated into the curriculum, pedagogy and assessment as suggested by an in-depth study by Thomas, Jones and Ottaway (2015) on effective practice in the design of directed independent learning opportunities conducted in the United Kingdom as commissioned by the Higher Education Academic (HEA) and the Quality Assurance Agency for Higher Education (QAA). The learning environment should also support independent learning through the provision of appropriate learning materials such as books, online learning materials and physical learning spaces in the library and in the university. Academic support and non-academic staff should also be actively involved in engaging, enabling, and facilitating students to be able to avail of the opportunities or services of the university in support of their learning or create co-curricular and extra-curricular programs that foster independent learning. This will ensure that the benefits of independent learning will be fully realized by the students.

A whole-school approach or integrated approach to independent learning can have the following components:
   (1) A clear policy direction on independent learning that can be reflected in the vision and mission of the university. This will include a thorough orientation program for students and parents for them to appreciate the intent and purpose of the independent learning policy.
   (2) Inclusion of independent learning as a program outcome and a graduate attribute
   (3) Integration of independent learning into the teaching and learning approaches, including assessments, such that they are geared towards achieving independent learning.
   (4) Developing independent learning through student support services such as co-curricular and extra-curricular activities, leadership and welfare, and development programs.
   (5) Integration of a course on independent learning designed to develop or reinforce soft skills of students such as goal setting, time management, and self-discipline, which are some of the challenges experienced by the respondents during online and independent learning.

Limitations of the Study

The study focuses exclusively on the experiences of selected college students on independent learning through online modality during the COVID-19 pandemic. The research locale was limited to the Lyceum of the Philippines University Manila. The study was also limited to full-time second-year college students of the Lyceum of the Philippines University Manila who were enrolled for the Academic Year 2021-2022.

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Forgetting Green Biographies:
Memories and Relationship With Plants in a Primary School

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Abstract

This research explored the experiences of children and parents in a primary school class in Reggio Emilia, Italy. Participants took to the green archives where they engaged in a process of exploration, rediscovery and appreciation of their relationship with plants. The researchers' approach, based on active listening and curiosity, brought the sleeping green memory to life. This facilitated a narrative practice that played a pivotal role in shaping a new ecological and cultural trajectory embedded in the multiple realities of everyday life. The stories revealed the central role of children as keepers of traditional plant knowledge, setting the stage for intergenerational transmission and sharing across different cultural contexts in the urban setting. Consequently, this promoted the dissemination of fluid and diverse knowledge. At the same time, parents became constructive participants in their children's activities. They invested time in sharing their own experiences. Ethnobotanical research analysed and evaluated the developing relationships that children and parents developed with the plants, thereby reviving ancestral links. In this context, education served as a vehicle to enable individuals to cultivate their inner gardens, embracing all plant species and promoting an integrated approach between theoretical knowledge and practical application. The design of this educational environment is a neutral space, capable of being home to different experiences. In addition, the act of storytelling about relationships with the natural world would create a deep sense of well-being for all participants and facilitate a new form of parent-child connection in the school environment.

Keywords: Narration, Green Biography, Ethnobotany, Plants, Biophilia

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Introduction

The aim of this study was to explore children's and parents' relationships and perceptions with plants, using ethnobotany as the primary framework of investigation, an interdisciplinary science dedicated to the study of human interests and interactions with plants across historical periods (Caneva et al., 2013). The research methodology involved the meticulous observation of the relationship between parents and children with plants through the use of various modes of interaction such as discussions, verbal communication, drawing, and written expression. In addition, the study was also concerned with the analysis of the influence of memory on plant knowledge.

Memories were identified as an integral part of the learning process, serving as a conduit through which children acquire knowledge about plants and their environment. The accumulation of such prior knowledge built the basis for a heightened interest in and empathic connection with the plant world.

The results of the study suggested that engaging in discussions and sharing memories of plant-related experiences could potentially contribute to a pervasive sense of well-being. In addition, the data suggested a plausible influence of these nature-related memories on the parent-child relationship. It was hypothesised that dedicating time to recounting childhood experiences and relationships with plants may strengthen the emotional bond between parents and children, thereby fostering greater mutual understanding.

Background of Existing Literature and Information in Support of This Study

This study located itself in the framework of two synergistic approaches, specifically those described by Monica Guerra (2021; 2018) and Beate Weyland.

Monica Guerra, a distinguished pedagogue and professor at the University of Bicocca in Milan, led a research and action initiative in the Italian context, focusing on the importance of outdoor education and the enrichment of educational environments. Her work encompasses different contexts such as the street, the neighbourhood, the city, the park, the courtyard and the garden. Central to her research is an emphasis on fostering encounters and relationships with nature, facilitated through activities such as the collection and creative cataloguing of natural materials. Professor Guerra's academic efforts gave rise to the development of specialised courses and master's programmes aimed at spreading a profound understanding of the interplay between education and nature. Her influential studies have catalysed the establishment of a robust network of scholars working together to advance knowledge on the subject.

Beate Weyland is a distinguished scholar with a keen interest in the evolution of schools and their physical spaces. Currently a faculty member at the University of Bozen/Bolzano, she conducted interdisciplinary studies focusing on the nexus between pedagogy, architecture and design to bring about transformative changes in educational environments. Over the years, her research focused on various aspects of educational development, with a particular emphasis on cultivating a sensory approach to education, as described in her remarkable work (Weyland, 2017). This line of enquiry involves the investigation of mediators, artefacts and games designed to facilitate learning experiences through engagement with the five senses. The study under consideration aligns with the trajectories of the recently established EDEN LAB (Weyland, 2022) laboratory, a scientific initiative that brings together interdisciplinary

reflections on the interplay between pedagogy and architecture (Weyland, 2015; Weyland, Galateo, 2023). This laboratory, directed by Beate Weyland, combines a nuanced exploration of the relationship between pedagogical methodology and architectural design, focusing on integrating plants into educational and academic environments. The initiative introduced plants into indoor environments originated during the period of lockdown caused by the pandemic. The concept materialised through the implementation of an online course with students of Education Sciences, focusing on the theme of sensory education (Weyland, 2017). This course integrated the plant as a mediating element, perceived as a living subject with an educational role. Further exploration of this concept developed during a seminar called "Nature inside the home: before the green classroom", which conducted as part of a series of open dialogues on education offered during the three-month closure in 2020. This seminar explored the topic in-depth, involving teachers and educators in discussions. The overall aim investigated the feasibility of fostering "proximity relationships" with domestic nature in educational spaces. Since autumn 2020, in response to the need for physical distance imposed by the pandemic and to increase perceived well-being, resilience and quality of life, two green classrooms have been installed at the Faculty of Education of the Free University of Bozen/Bolzano. The initiative, based on studies by Raith and Lude (Raith & Lude, 2014) and Mancuso (Mancuso, 2018), involved the acquisition of 100 plants to be placed in two rooms originally designed for 100 students. With a focus on fostering didactic innovation in line with the "GreenComp" framework (Bianchi et al., 2022) and care (Mortari & Paoletti, 2021), group activities organised during the general didactic workshops. These activities aim to involve future teachers in the creation of materials and games that facilitate active interdisciplinary interactions with plants. This strategic approach aimed to equip future teachers with the necessary tools to reflect on and incorporate innovative teaching methods in the field of green education. While the initial proposal was to use plants as practical alternatives to facilitate physical distancing, the underlying rationale went beyond mere functional considerations. Indeed, the deeper purpose was to consider how the introduction of plants into indoor spaces could not only make academic and school environments more inviting and resilient (Aydogan & Cerone, 2021), but more importantly, to cultivate close relationships with plants that evoke emotional and affective dimensions. This deliberate integration of indoor nature was also intended to strengthen bonds of care and foster a sense of discovery (Goleman et al., 2012). Facilitating students' learning about plants and incorporating this knowledge into teaching practices in schools was also an opportunity to align with the provisions of the new law that came into force on 20 August 2019. This legislation mandates the inclusion of civic education in school curricula, with a special focus on promoting the health and well-being of children (Art. 3). It also emphasises the importance of providing education to cultivate a caring relationship with the environment and promote awareness of the 2030 goals. Integrating plant education into the curriculum not only contributes to botanical knowledge, but also serves as a vehicle for achieving the broader educational objectives outlined in the legislative framework.

EDEN (Educational Environments with Nature) (Weyland, 2020), focused to develop a comprehensive theoretical framework focusing on the intersection of education and sustainability, with a particular emphasis on the integration of plants into indoor educational spaces. The primary aim of promoting plant familiarity in such environments was to cultivate emotional-affective relationships with botanical entities. This deliberate engagement aims intended to initiate a heightened awareness and sensitivity to nature as a whole, extending beyond indoor environments to include outdoor environments and, in particular, emphasising the importance of plants in the wider natural context. One of the key goals of the workshop was to consciously cultivate intimate relationships with plants, in line with the wider quest

for an essential reconnection with nature, as exemplified by the sentiments expressed by Lucy Jones (2020). The research presented here is fundamentally concerned with meticulously examining the relationships that exist between parents and children and their interactions with plants. Through the use of green memories, the study tried to facilitate a nuanced process of awareness raising. This research was closely aligned with the overarching aims of the workshop, which evolved into a platform that fosters interdisciplinary interactions among scholars dedicated to advancing initiatives aimed at supporting and promoting the vital process of reconnecting with nature.

Rooted in Nature: Reconstructing Children's and Parents' Interests Using the Ethnobotanical Approach Through Green Memories

The connection between humans and the natural world had its roots in the earliest stages of human existence and embodies an intrinsic relationship that has continued throughout the ages. This constant connection evoked a deep sense of well-being, a sentiment supported by scientific literature that emphasises the importance of integrating our surroundings with plants and natural elements (Danon, 2021; Maas et al., 2009; Stuart-Smith & Zuppet, 2021). Furthermore, the act of expressing or narrating personal experiences (Demetrio, 2015) emerged as a conduit for individuals to achieve a sense of integration, allowing them to shape their moments in a creative and inspiring way.

In the essay entitled "Education and Nature" (Antonietti, 2022), Luigina Mortari examined the philosophical perspectives of Maurice Merleau-Ponty, focusing in particular on the concept that nature embodies life and sensible matter, with the human being serving as an integral link in the network of existence. The discourse placed significant emphasis on the role of thought in human life, drawing an equivalence between cognitive processes and the imperative of teaching children an ecological framework for interpreting their directly experienced realities. The essay argues that a deep connection to practical experience is essential for the cultivation of discursive intelligence, a capacity by which individuals interpret and understand the complexities of the world. The ecological philosophy of education is invoked as a guiding principle for a pedagogical practice that aims to rekindle early experiences of nature in the world. The proposal was to use existing knowledge and consciously engage the senses to cultivate a new form of attentive receptivity and emotional resonance in interaction with nature and the environment. The author emphasises the need to delve into the biological matrix of life and advocates an exploration that departs from entrenched cultural codes deeply rooted in the paradigm of modernity. This assertion underscores the notion that each individual archives memories and interpersonal encounters in his or her cognitive faculties. Sensory engagement with the environment, which impresses significant impressions on our minds, becomes a central aspect of our cognitive experience. This interactive process emerges as a substantive topic for discussion and takes on a formalised form when individuals find themselves immersed in situations of particular interest. The research aimed at influencing the learning process of the relationship with plants (Hidi & Renninger, 2006) wanted to support and maintain children's interest. Starting from an exploration of the children's prior knowledge, various conversations began with the explicit aim of understanding the depth of their knowledge and how they organized and internalised this knowledge, both in terms of conceptual understanding and mental representations. In industrialised areas, there is a clear lack of direct contact with nature among school-age children, often accompanied by deficiencies in the recognition of living organisms, their biological characteristics and their importance in ecosystems or their contribution to human existence (Tunnicliffe, 2001). Although it could be assumed that this condition is more

prevalent in urban areas (Tuan, 1978), some studies have shown a decline in environmental knowledge even among children from rural areas (Díez et al., 2018; Ianni et al., 2015). Forest loss poses a direct threat not only to the health of the planet, but also to human well-being, as highlighted in Goal 15 of the 2030 Agenda. There is therefore an urgent need to protect, restore and promote the sustainable use of terrestrial ecosystems. This requires the adoption of sustainable forest management practices, active measures to combat desertification and decisive action to halt and reverse both land degradation and biodiversity loss. Profound changes in urban development are having a significant impact on our well-being, encompassing both physical and psychological dimensions. The process of urbanisation imposes a wide range of selective pressures on people, with significant consequences such as changes in mortality rates, demographic patterns, the spread of disease and the presence of environmental factors such as air, water and soil pollution. Other critical aspects, such as hygiene, nutrition, social relations and the composition of the microbiota, are also subject to change, each playing a pivotal role in shaping the course of evolution (Mancuso, 2023).

How can children and parents be brought back to reconnect with Nature, with plants? What knowledge and memories are preserved about plants? What special moments emerge from the memory of children and parents?

In response to these inquiries, ethnobotanical studies have emerged as a valuable tool for the preservation of knowledge about plants, knowledge that would otherwise be at risk of fading with time (Briceño et al., 2017). The goal was to actively perpetuate the memory of the past and the historical relationships between humans and plants. This interdependence makes humans deeply dependent on plants, to the extent that it shapes our memories. Research that began with an attentive exploration of children's prior-existing knowledge and innate connection to plants underscores the notion of an active child (Dewey, 2019; Edwards et al., 1998; Giudici, 2011) who actively constructs his or her own learning process. Such a child was not simply a passive recipient, but rather an individual capable of absorbing and retaining information about experiences with nature, demonstrating competence in recognising the profound interdependence between humans and living beings. The archive of memory (Demetrio, 2015), in the realm of children and parents, consisted of a nuanced interplay of different elements, encompassing spatial dimensions, animals and plants. This archive played a central role in the development and maintenance of a «language of affect» (ivi, pag.21), highlighting the extent of children's awareness of plants. The research focused on exploring the evolving relationships over time and the children's methods of memorisation in this specific context. Using narrative as a medium, the aim was to encourage individuals to retrieve and articulate the content held in their memory, facilitated by emotional support. Demetrio (2020) proposed that a cognitive biography serves as a narrative that describes the gradual formation of a cognitive profile over time. This complex process developed as a social history in which the human mind organises and constructs its understanding of the world. At the same time, it experimented with cognitive styles that prove to be the most appropriate and functional for its purposes. An emerging paradigm articulated in the form of a new ecology of thought that seeks to establish a connection between humans and the planet based on a sense of belonging rather than a purely utilitarian relationship (Guerra, 2021). This expansive perspective should foster an awareness of our inherent interconnectedness with the natural world and cultivate a deep sense of belonging and responsibility towards the environment. This transformative paradigm promoted a view of the Earth as an integrated system, emphasising the importance of fostering sustainable and harmonious relationships with our habitat. It advocated a move away from viewing the environment as a resource to be exploited in isolation and instead promotes an integrated and impact-conscious approach. In

essence, it represented a shift in perspective designed to reshape the way we perceive and engage with our planet, advocating a more respectful and supportive attitude towards the surrounding environment.

Methodology

The research integrated into a Ph.D. dissertation in Reggio Childhood Studies, a programme that embodies interdisciplinary and international perspectives aimed at elucidating the educational philosophy associated with early childhood that originated in Reggio Emilia. Located in the Emilia-Romagna region of northern Italy, Reggio Emilia is famous for its pioneering educational methodology, known as the ″Reggio Emilia Approach″ (REA). The Reggio Schools were founded after the Second World War by a group of women who wanted a better education for their children. Women and men worked together to build different schools to educate their children differently and created community schools where children could actively participate in their learning and knowledge (Borghi & Frabboni, 2017; Giudici, 2011). The school chosen together with the research group on the basis of its specific characteristics in the Institute Comprensivo Manzoni. This school, in collaboration with the Reggio Children Foundation, partner of the PhD course, has long been committed to promoting quality education in the Reggio Emilia area. Data collected took place on a consistent weekly basis from November to April. The data collected underwent categorisation and analysis using Atlas.ti, with subsequent percentages calculated using an Excel spreadsheet. About 67% of the pupils in the fourth grade of a primary school were born in Italy (Figure.1), while the countries of origin of their parents showed a remarkable diversity (Figure.2). In addition, the parents of Italian origin had very different cultural backgrounds, reflecting the distinct socio-cultural characteristics of the different regions and cities of Italy, from the far north to the south. An ethnobotanical approach explored the interests of both children and parents. This method investigated how people develop their relationship with plants over time, including aspects such as food, rituals, textile fibres and other modalities (Caneva et al., 2013).
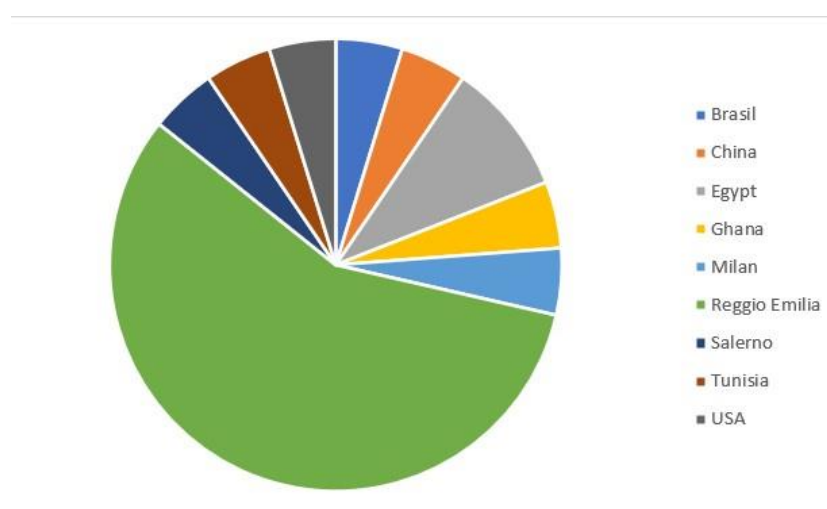
Figure 1: Place of birth children
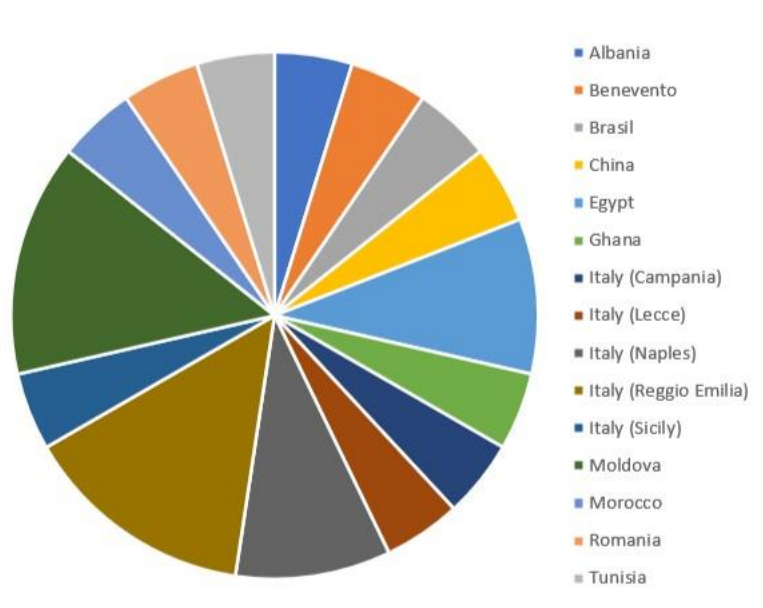
Figure 2: Parents' place of birth

The methodology used in this study draws on ethnography to facilitate the collection of data from the group of children and parents. Ethnographic research was instrumental in reconstructing events and elucidating the local educational environment through the inclusion of multiple subjects and perspectives. The active participation of children, teachers and parents in the descriptive processes framed them as co-constructors of meanings, interactions and practices (Pastori, 2017), fostering a small community that is inherently rich in knowledge and expertise. The inclusion of narrative inquiry introduced additional complexity into the research framework as the researchers took an integral role in the construction of the narratives. Throughout the fieldwork, weekly sessions of approximately three hours each were scheduled with the children. These sessions included initial interviews aimed at gathering information about their relationship with plants. Following each session, the children were tasked with processing the information discussed. This process served the dual purpose of refining and focusing the information in their individual memories as well as collectively as a group. With regard to parents, semi-structured ″one-to-one″ (Rubin & Rubin, 2012) interviews were conducted. This method allowed for the formulation of opening questions, which encouraged flexibility in the order and wording of subsequent inquiries. In this context, the researcher assumed the role of a facilitator, maintaining the interviewee's full focus. This approach was designed to give interviewees maximum freedom to express themselves. Data collection involved audio recording and subsequent transcription by the researcher. Thematic qualitative analysis was used for data analysis. This method, known for its theoretical flexibility, serves as a comprehensive research tool capable of providing a detailed and rich account of the data, albeit with potential complexity (Braun & Clarke, 2006). The initial phase of data organisation involved the management of coded files, available in both paper and electronic formats, using Atlas.ti and Microsoft Office software. This was followed by the systematic structuring of the data into categories, using Kellert's ″The Values of Life″ as a theoretical reference (Kellert, 2004; Kellert & Wilson, 2013).

Results

The narratives of both participants and researchers were intricately interwoven, forming a common narrative that evolved throughout the research (Connelly & Clandinin, 1990). This paper extrapolated the values that underpin the construction of green narratives by children

and parents. In particular, these stories evoked a deep sense of well-being. This sense of well-being, derived from reflections on plants, goes beyond mere physical contact and includes the recollection of memories associated with the plant kingdom. In addition, well-being is derived from the time parents spend with their children sharing experiences and moments related to plants. Illustrative examples of such stories from both children and parents are given in Table 1.

Children's memories	Categories
I like watermelons because my grandfather is in Moldavia and has lots of them. Every day we go to pick them_S.R	Utilitarian
In Egypt I have a vegetable garden and a lemon tree and a peach tree. The roses are somewhere else, and I remember my grandfather was alone there_A.	Moralistic
The lemon reminds me of my grandfather. This tree was given to my father two or three years ago, and now we have it here at home in memory of my grandfather, who has died_T.	Moralistic
Parents' memories	
No, I don't have any plants. I remember my mother with this vegetable garden and this hall full of plants_M. A.	Aesthetic
I spend my childhood among plants. I want to pass that on to my daughter_M. N.	Umanistic
We used to eat mint both for the cold and to add flavour to our food_F. L.	Utilitaristic

Table 1: Examples of conversations

The values that we have identified as shaping different aspects of the physical and mental well-being of human beings are outlined below:

Aesthetic: the physical beauty of the natural world is without doubt one of its most powerful appeals to the human animal. From the contours of a mountain landscape to the ambient colours of a setting sun, to the fleeting vitality of a breaching whale, the complexity of the aesthetic response is evident.

Dominionistic: experience of nature reflects the desire to dominate the natural world. This perspective may have been more common in earlier periods of human evolution; its occurrence today is often associated with is often associated with destructive tendencies, lavish waste and the plundering of the natural world.

Humanistic: human beings can experience intimacy, trust and a sense of relationship and kinship through the development of a deep sense of affection for the natural world. These feelings of affection and connection with nature and other living beings can have a mentally and physically rejuvenating effect.

Moralistic: perception of universal patterns in nature can provide a basis for a moral code. It can make one feel connected and committed. These feelings promote mental and emotional well-being.

Naturalistic: being in contact with nature, feeling a sense of curiosity and wonder.

Scientific: our physical well-being can be positively influenced by the practical knowledge that can be gained through scientific activities. Mental wellbeing can be fulfilled and enhanced through intellectual activities.

Symbolic: the use of nature as a symbol is perhaps most critically reflected in the development of human language and the complexity and communication of ideas fostered by this symbolic methodology.

Utilitarian: when we recognise our utilitarian dependence on nature, physical and mental well-being improves. Recognising our dependence on the natural world for resources such as food, water and shelter can help us feel grateful and connected.

The data analysed shows that the most frequently cited categories are humanistic and utilitarian (Figure: 3). The sense of trust, intimacy and emotionality that develops through contact with the natural world. Both mental and physical wellbeing is generated through connection with other living beings.
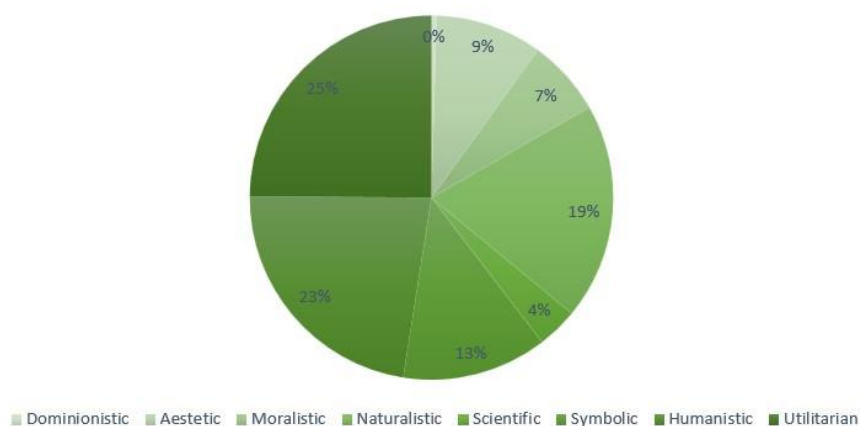
Figure 3: Categories of value

A visible process of narrative reconstruction emerged as children articulated their associations with plants. This reconstruction involved an imaginative effort to elucidate connections with plants that go beyond the utilitarian perspective of seeing them solely as a source of food. The narratives created by the children take on a profound meaning. They symbolise a deep sense of tranquillity derived from contemplating their intricate connections with the plants. These stories, therefore, encapsulate the essence of peace that comes from a thoughtful engagement with the plant world, transcending the mundane and taking on a more sublime

status. Children's fascination with plants was evident in their propensity to explore and understand species from different cultural backgrounds. This curiosity went beyond mere botanical interest. It included a keen interest in the origins and nutritional properties of food derived from these plants. At the same time, there was a palpable desire to rejuvenate neglected gardens in their domestic environments. This tendency to revive neglected green spaces was indicative of a growing awareness of environmental responsibility and a proactive commitment to improving the environment. In essence, these manifestations emphasised the multifaceted nature of children's connection with the plant world, encompassing cultural curiosity, nutritional research and commitment to ecological restoration. In the narrative, the intrinsic links with plants were meticulously delineated, giving rise to references to people, contexts, places and experiences that are intimately linked to specific moments. These memories, firmly rooted in the reservoir of prior knowledge held by children and parents, function as powerful tools to cultivate their curiosity and empathy. By weaving these plant-centric anecdotes into the fabric of their shared experiences, the stories served as conduits for a nuanced understanding of the interplay between humans and the botanical world. These deep-rooted memories served as catalysts, not only stimulating interest but also fostering an empathetic connection with the intricate ecosystems and diverse range of individuals and environments associated with these plant-related experiences. In essence, the narrative became a conduit for the transmission and perpetuation of knowledge, shaping a collective consciousness that goes beyond individual memories to foster a broader appreciation of the interconnectedness between humans and the plants.The examples provided (Figure 3) illustrate experiences related to diverse contexts, highlighting the richness and complexity of the relationships between children and the plant world.
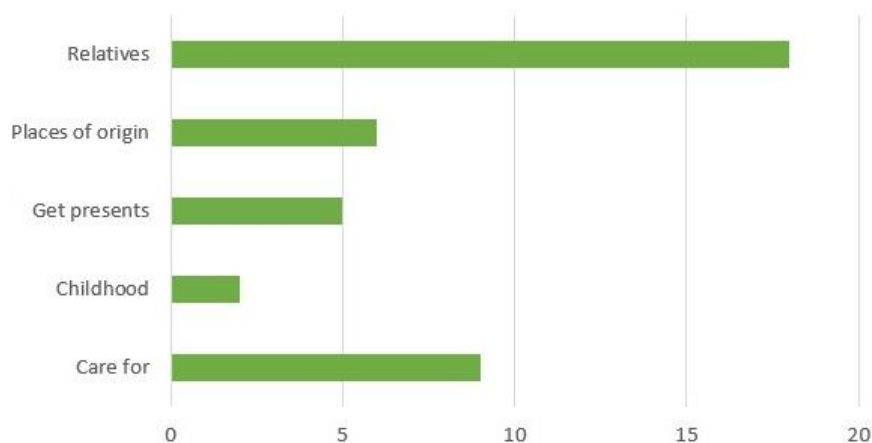
Figure 4: Relationship between children and plants

This report stressed the profound impact on the well-being of both children and parents as they articulate how their lives have been significantly improved. Shared experiences with plants emerge as not only valuable but transformative, with time spent together presented as an invaluable opportunity for mutual engagement. In this shared space, children and parents not only exchange anecdotes but also share practices rooted in their collective childhood experiences. These shared moments contribute significantly to an enhanced sense of well-being, fostering a positive environment where family bonds are strengthened through a shared appreciation of the natural world.

Conclusion and Discussion

How can children and parents be brought back to reconnect with Nature, with plants?
Through initiatives that explored children's and parents' interactions with plants and the intergenerational transmission of knowledge, there was the potential to foster a reinvigorated engagement with nature and mitigate what Kahn (2008) has identified as 'generational environmental amnesia'. The implementation of such projects should aim to rekindle ecological awareness and preserve the wealth of knowledge associated with plants, thereby acting as a mitigating force against the declining connection with the natural environment that has occurred over time.

What memories are preserved about plants?

Children and parents preserved memories of their relationships with plants and placed them in their own archives. These memories manifested as essential traditional knowledge to be passed on to future generations to deepen and consolidate our connection with nature (Kahn, 2008, cit. in Barbiero, 2012). The aim of the research was to stimulate children's and parents' interest in plants and to make them active subjects in the process of relating to the plant world.

What special moments do children and parents remember?

For both children and parents, memories were intrinsically linked to a variety of experiences that recall significant moments in their lives. These memories were contextual, arising from direct experiences, observations, listening to past stories. They were authentic emotional encounters that transform feelings into emotions (Barbiero, 2012).

Their memories, classified according to Kellert's values (S. Kellert, 2004), showed how the simple act of talking about plants is a great source of well-being. They also highlighted the important role that plants play in building positive relationships, both with others and with parents. Research demonstrated that a relationship with plants, in the various contexts in which they were present, promoted a solid sense of well-being in people. This approach recognised and nurtured the intrinsic human connection to nature for the benefit of both the individual and the planet as a whole. The primary goal was to inspire the field of education to cultivate a new form of connection and relationship with the natural world, ultimately contributing to a more sustainable future (UNESCO, 2021). It could also create new grounds for involving parents in primary education, where their participation is often underestimated. Parental involvement contributed to children's emotional and cognitive development. Such involvement provided parents with an opportunity to actively participate in their children's learning and to spend meaningful time-sharing precious moments with them (Edwards et al., 1998). It could be assumed that memory plays a crucial role in our relationship with nature, acting as a conduit for storing and recalling experiences, knowledge and emotions related to the natural environment. Through memory, past interactions with nature could influence our present and future attitudes and well-being. The integration of cultural perspectives was an essential means of gaining a fuller understanding of relationships with nature. Integrating nature-based education programmes into school curricula could contribute to the transmission of environmental memory. Involving students in practical and reflective experiences could strengthen the emotional connection with nature. In addition, sharing nature-related practices, traditions and memories between different cultural groups could promote a deeper mutual understanding and a shared awareness of the importance of environmental conservation.

Acknowledgements

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Enhancing Mathematics Classroom Teaching Through Micro-Lessons and Increased Learning Interest

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Abstract
This research discusses how to strengthen the teaching of mathematics class by using micro-lessons and improve students' interest in learning. In order to solve these problems, this study puts forward the application of micro-lesson in mathematics teaching. The needs analysis is carried out in advance with the aim of stimulating students' perceptions of learning using micro-lessons. The purpose includes of this study were: 1) To identify the efficacy of the proposed micro-lesson on mathematics classroom learning. 2) To compare students' learning achievement through pre-test and post-test the micro-lessons to study mathematics and 3) To assess satisfaction from using micro-lessons. The sample for this study included 30 third-grade students studying in a private school in Guangdong Province. Students were selected using a simple random sampling technique. The data were analyzed using mean, standard deviation and t-test. The findings showed that 1) The efficacy of the proposed system (E1/E2) were at levels greater than 80 percent. 2) The students' achievement based on the post-test was higher that pre-test significantly at the level of .05. 3) The student's level of satisfaction toward the system was at the highest level. The results show that the micro class is beneficial to the learners' interest in mathematics. The application of micro-lessons in mathematics classroom teaching reduces learners' anxiety in mathematics learning, and there is a significant difference between the experimental group and the control group.

Keywords: Micro-Lessons, Subject Teaching, Teaching Practice, Application

1. Introduction

Under the background of the high efficiency development of information technology, the teaching before, during and after class of teachers in primary schools has undergone new changes and developments. The transformation from the traditional single offline course and teaching to the "online + offline" mixed teaching model provides a convenient platform and rich resources for the extension of the classroom. Such massive resources provide more humanized technical support for the teaching of primary school teachers, and constantly optimize the teaching practice and classroom of primary school teachers, which also requires the continuous development and improvement of the information ability of primary school teachers, so as to better combine digital information with teaching.

"Micro-lessons" refers to the whole process of recording teachers' wonderful teaching and learning activities centering on certain knowledge points (key and difficult points) or teaching links in the course of education and teaching both inside and outside the classroom with video as the main carrier. Therefore, "micro-lessons" is not only different from the traditional single-resource teaching resources such as teaching examples, teaching courseware, teaching design, teaching reflection, but also a new kind of teaching resources inherited and developed on its basis. In education and teaching, the content taught in the micro-lessons is in the form of "points" and fragments.

2. Research Objectives

This study aims to combine micro-lecture with various courses to realize the deep integration of information technology and education teaching, which can meet the individual learning needs of students and change their learning methods.

2.1 To develop micro-lessons application to improve students' self-learning ability.

2.2 Students in the learning achievement test comparison before and after.

2.3 Students satisfied with using micro lessons to learn.

3. Research Hypothesis

The emergence of micro-lessons will break the traditional teaching methods, satisfy students' personalized learning of different subject knowledge points and select learning according to needs, which can check the gaps and make up for them, and strengthen and consolidate knowledge. It is an important supplement and expansion resource for traditional classroom learning.

4. Research of Methodology

4.1 Variables

4.1.1 Independent variable is a small video of learning mathematics curriculum knowledge in micro-lessons to improve students' learning interest.

4.1.2 The dependent variable is (1) Student learning achievement; (2) Student satisfaction toward the micro lessons.

4.2 The population: The objects of this study are 280 students and 20 teachers in Grade 3 of Country Flower City School, Shunde District, Foshan City, Guangdong Province, China.The sample of this study are 30 students and 4 teachers from Country Flower City School, Shunde District, Foshan City, Guangdong Province, China.

4.3 The research instruments

4.3.1 Small videos for learning subject knowledge in micro-lessons;

4.3.2 "Questionnaire star" APP.

4.3.3 The students were pre-test and post-test.

4.4 Content
This study will investigate the application status of micro-lessons in primary school mathematics teaching, so as to understand the shortcomings of the current micro-lessons in primary school mathematics teaching, collect the opinions of teachers and students on the application of micro-lessons in class, and then analyze, synthesize, compare and summarize, so as to provide suggestions and measures for primary school mathematics teachers to use micro-lessons in class.

5. Conclusion

The analysis result of the above information answers to the research objectives as follows:

5.1 The effectiveness of using Micro-lessons in mathematics classroom learning shows that the E1/E2 coefficient 1 of the learning process score (E1) is equal to 82.83, and the performance score (E2) is equal to 81.53, which is higher than the standard defined by 80/80. The research results clearly show that the mathematics classroom teaching effect is good in Country Flower City School.

Items	n	$\overline{X}$	Percentage	S.D.	Standard	E_1/E_2
Ongoing score	100	82.83	82.83	3.51	80	82.83
Post-test score	30	24.46	81.53	2.43	80	81.53

Table 1: E1/E2

5.2 The third grade students in Country Flower City School were taught Micro-lessons to improve their interest in learning mathematics. The results of the post-test results were higher than the pre-test results, with a significant level of 0.05.

5.3 The results of students' satisfaction show that students' satisfaction with Micro-lessons teaching is higher, and the average score is higher 4.22, especially in terms of access to teaching content and participation in other learning resources, students have higher satisfaction with Micro-lessons teaching and are more suitable for learning.

5.4 Summary
In this research, researcher have suggested that the results of the study should be applied as follows:

5.4.1 The development of Micro-lesson instruction should be carried out step by step according to best practices in the field, as this will enable researchers to achieve the goal of building Micro-lessons instruction courses to enhance teaching effectiveness and implement them more successfully.

5.4.2 Mathematics classroom teaching is a subject that has been studied in many aspects, and it has been found that using Micro-lessons teaching can successfully improve students' interest in learning mathematics, so it is necessary to further study the application of Micro-lessons to the learning and teaching of other subjects.

5.4.3 Taking into account the different learning styles of students, students should be given the opportunity to decide whether they wish to study independently or in groups. This will promote cooperative learning skills and peer correction.

5.5 Discussion

The research and discussion on carrying out Micro-lessons teaching in mathematics classroom in Country Flower City School to improve students' interest in learning mathematics are as follows:

5.5.1 Analysis of Using Micro-lesson to study mathematics in class of efficiency of $E_1/E_2 = 80/80$

The experiment construction based on the application of Micro-lesson in mathematics classroom teaching to improve the interest of third grade students in learning mathematics in Country Flower City School is divided into three stages, aiming to test whether E_1/E_2 efficiency value under the 80/80 efficiency standard can be reached before the experiment is implemented. The first stage is traditional teaching. 30 students are taught in traditional mathematics classroom. The second stage is called the use of Micro-lessons in mathematics classroom teaching. After this video for Micro-lesson teaching has been modified and refined, the final stage is called field testing. It was carried out by 30 students. The results show that the E_1/E_2 efficiency is 82.83/81.53. This result is consistent with the results of several related studies. Ye Ma (2023) conducted a study on the application of Micro-lesson teaching technology, and the results showed that the efficiency value of E_1/E_2 was 80/81.80. In addition, Yanghui Lu (2022) also showed that the efficiency of E_1/E_2 was 80/80 by analyzing the application significance of Micro-lessons in mathematics classroom teaching. Xinjun Zhao (2022) developed an innovative teaching model based on Micro-lesson teaching, and the results showed that the efficiency level of E_1/E_2 was 83.50/84.25, which met the standard.

5.5.2 A comparison of students' use of Micro-lessons in mathematics classroom learning tests

Through the comparison of students using Micro-lessons in mathematics classroom learning performance, the results show that students in the Micro-lesson learning group score higher in the mathematics classroom using Micro-lessons learning performance test, reaching a significant level of 0.05. When the content of Micro-lesson teaching is suitable, Micro-lesson teaching can produce effective learning effect. This is because the tool can help motivate users to use fascinating techniques such as motion graphics and images. Qiang Ma(2020) compared teaching using micro-lesson resources with traditional teaching methods and showed that students using Micro-lesson teaching had higher academic performance, with a significance level of 0.05.

5.5.3 Students' satisfaction with the use of Micro-lessons in mathematics classroom learning
According to the results of the experiment, the students have a high degree of satisfaction with the use of Micro-lessons in mathematics classroom learning. This is consistent with the findings reported in the literature (Ma Deng, 2022; Dan Ma, 2020; Xiaoyong He, 2021; Ping Chen, 2022 and Ying Chen, 2023). In these studies, two-thirds (2/3) of students were very satisfied with the use of Micro-lessons for math classroom learning. This is because they can use Micro-lesson resources anytime and anywhere. They benefit from learning new things at their own pace. In addition, their learning speed can be adjusted according to their learning ability.

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Investigating Key Determinants Influencing the Improvement of Students' Potential and Employability via Smart Campus Platform at Guangdong Vocational College, China

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Abstract

Building the essential competencies in the professional field that help increasing the employment rates are the major challenge for overall vocational colleges in China. As they are extremely difficult and limiting the in-depth analysis of this correlation of success factors. This study aims to delve into the current academic performance of students at Guangdong Vocational College and their employment status in their respective fields of study. We discovered how the Integrated Smart Campus Platform significantly affects academic achievements and the employability rate of graduates. We identified a series of key determinants that have a profound influence on student's academic success and employability rate based on a comprehensive statistical analysis. The sample comprised 100 students, 20 teachers, and 10 school administrators from Guangdong Vocational College, China. Through Principal Component Analysis (PCA) and Multiple Regression Analysis (MRA), we discerned that: 1) The Integrated Smart Campus Platform plays a pivotal role in elevating academic performance and the employability rate of graduates, accounting for 68% of the variance; 2) Approximately 83% of students, teachers, and administrators actively engaged with the platform, expressing a 76% satisfaction rate; 3) Technical support and professional training emerged as the key factors in enhancing the efficiency and satisfaction rate of platform usage, with respective influence values of 0.45 and 0.38. This research offers valuable insights into the realm of higher vocational education, showcasing the potential of technology in bolstering student potential and employability rate.

Keywords: Academic Achievement, Employability Rate, Smart Campus Platform, Educational Determinants, Vocational Education and Training

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Introduction

With the accelerated pace of globalization and the rapid evolution of technology, the modern labor market is undergoing unprecedented changes. Emerging industries such as artificial intelligence, big data, and renewable energy technology are progressively replacing traditional sectors, bringing forth new career opportunities and challenges. In this context, businesses and organizations are increasingly seeking employees who possess interdisciplinary skills, innovative thinking, and self-learning abilities. Hence, providing students with forward-looking education closely linked to market demands has become paramount.

In recent years, China's government has attached great importance to the development of higher vocational education, pouring significant resources into this sector. Especially with the impetus of the "Dual High" strategy and the "New Engineering" initiative, vocational higher education has seen swift growth. Nevertheless, the employment rate and job quality of higher vocational students still pose certain challenges. According to the Chinese Education Statistical Yearbook, although the overall employment rate of vocational graduates has consistently remained above 90% in recent years, the quality of their employment (such as salary levels, job match, and career development opportunities) still requires improvement.

Guangdong Vocational College, a renowned vocational institute in Guangdong Province, China, has long been committed to nurturing highly skilled application-oriented talents. To better align with the labor market's requirements, Guangdong Vocational College has introduced the concept of a "Smart Campus" in recent years. By establishing an integrated platform encompassing teaching, management, and services, the institution aims to offer a more personalized and intelligent educational experience for its students.

The "Smart Campus" initiative is more than just a technological endeavor; it represents an exploration and practice of educational reforms. Through real-time data analysis, predictive models, and artificial intelligence, a Smart Campus can offer students more precise and tailored learning resources, helping them better tap into and develop their potential. Moreover, this initiative also provides school administrators with more scientific and objective decision-making insights, facilitating more effective educational and pedagogical reforms.

However, striking the right balance between technology and education, ensuring the "Smart Campus" truly benefits students' growth and development, remains a pivotal challenge. Based on this, the current research aims to thoroughly investigate Guangdong Vocational College's "Smart Campus" initiative, analyzing its tangible impact on boosting student potential and employment rates, while exploring potential challenges and opportunities.

Current State of Information Technology in Chinese Higher Vocational Education

In recent years, under the guidance of the Ministry of Education's drive to promote the informatization of vocational education, Chinese higher vocational colleges have taken concrete steps to unify their thoughts and actions. Seizing current opportunities, these institutions have propelled advancements in educational informatization, aiming to maximize the role and value of information technology in teaching and learning. In this backdrop, new educational management systems and models have emerged to achieve high-quality and inclusive education. To support these endeavors, the Chinese government has continually increased financial investments in education. During the "Twelfth Five-Year Plan", total

expenditure reached 12.2 trillion yuan, equivalent to the total educational investment of the first 30 years since the country's reform and opening up. Since 2015, China's fiscal allocation to educational informatization has been consistently increasing, with an annual budget allocation exceeding 4% of GDP. With substantial financial backing, the level of educational informatization in China has been on a steady rise.

In certain regions and institutions, the informatization of educational management has achieved interconnectivity and shared usage under national information systems, fulfilling schools' application needs and yielding significant results.

As early as 2012, the "Ten-Year Development Plan for Education Informatization (2011-2020)" was released, marking a milestone for China's educational informatization. By 2012, with the rise of internet applications in China, the informatization of vocational education was also rapidly advancing. Using 2012 as a reference point, the next three years, leading up to 2015, saw vocational education informatization entering an era of continuous exploration around emerging technologies. Two significant shifts occurred during this period. Firstly, the completion of multiple 100G backbone networks enhanced campus network speeds, drastically improving internet access experiences for teachers and students. Secondly, the rise of network clouds from 2012 brought a fresh direction to campus informatization, providing a new perspective for the evolution of educational informatization. Many institutions have now established data centers based on cloud architecture. In some of the more technologically advanced institutions, online learning has been made possible via network clouds.

Starting from 2016, the construction of one-stop services became a trend in vocational colleges. The emergence of these services symbolized a trend where informatization efforts should increasingly focus on improving the experiences of teachers and students. The primary goal is to "let data travel more, and teachers and students travel less, preferably not at all." Arguably, from the widespread adoption and evolution of one-stop services, higher education informatization in China began its initial foray into integrated development, allowing teachers and students to genuinely experience the various conveniences brought by informatization. This was a significant achievement of higher education informatization during the "Thirteenth Five-Year Plan" period. The outbreak of the pandemic in 2020 highlighted the pivotal supportive role of informatization in vocational colleges. Unlike the SARS outbreak in 2003, education could continue during the 2020 pandemic due to the maturity of informatization infrastructure and applications. Although there were initial challenges, subsequent developments steadily set the course right, effectively supporting primarily online-based teaching and related services.

Trends in Smart Campus Construction

The smart campus is often seen as a further enhancement and development of the digital campus, representing a higher form or phase of educational informatization. In 2010, Zhejiang University was the first to introduce the concept of the smart campus in China, in its "Twelfth Five-Year Plan" for informatization, where the smart campus was defined and described. Simply put, it encompasses ubiquitous networked learning, integrated innovative online research, transparent and efficient campus governance, diverse campus culture, and convenient campus life. In June 2018, the National Market Supervision and Administration and the National Standards Committee issued the GB/T 36342-2018 standard for the overall framework of smart campus construction. The construction of a smart campus mainly

employs key technologies such as the Internet of Things, cloud computing, mobile internet, and big data, combined with data resource development, to ensure resource and service sharing, accessible to anyone, anywhere, anytime. A smart campus offers a transparent and efficient management platform, real-time data analysis, flexible teaching methods, a ubiquitous learning environment, and convenient campus life. More and more institutions are now joining the ranks of smart campus construction, achieving notable results. The construction of a smart campus provides robust support for the promotion of educational informatization and the acceleration of educational modernization, holding significant practical value and profound implications.

Research Objectives

Following the guidance from policies including the "National Medium and Long-term Educational Reform and Development Plan Outline (2010-2020)", "Ten-Year Development Plan for Education Informatization (2011-2020)", "13th Five-Year Plan for Education Informatization", "Guiding Opinions of the Ministry of Education on Further Promoting the Development of Vocational Education Informatization", as well as the "Three Communications, Two Platforms", "Internet Plus" action plan, "Promoting Big Data Development Action Outline", "Education Informatization 2.0 Action Plan", and "Modernization of China's Education 2035".

This research analyzes the main problems that vocational colleges encounter in the application, management, and maintenance of teaching resources, and the reasons behind these problems. Combining theories of modern educational technology, creative education, non-directive teaching, constructivism, and educational communication, we aim to construct a teaching resource service platform for vocational colleges based on the smart campus concept. This study takes place in Guangdong Vocational College, China, The major concerns of this research include:
1. Investigating the academic performance issues at Guangdong Vocational College, and the employment status of graduates within their field of specialization.
2. Analyzing the significant factors affecting academic achievements and graduate employment rates via the Smart Campus Platform.
3. Evaluating the participation and satisfaction levels of students, teachers, and school administrators with the Smart Campus Platform.

The Smart Campus Platform of Guangdong Vocational College

Guangdong Vocational College is also committed to creating a comprehensive Smart Campus Platform, transforming it into a multifaceted system that simplifies campus management and enhances student services. The platform includes:

Intelligent Portal: This serves as the interface for various subsystems, allowing for seamless data flow and integrated services.

Internal Integration: This includes the administration, professors, and students. The system supports administrative operations, academic management, and student services.

Academic Management Information System: It oversees academic schedules, course materials, and performance tracking to improve the educational delivery.

Student Management Information System: This system manages student profiles, attendance, and engagement, fostering a personalized learning environment.

Financial Management Information System: It handles tuition fees, funding, and financial aid, ensuring financial processes are transparent and efficient.

Employment Information Platform: This platform connects students with job opportunities, internships, and career advice, enhancing their employability.

Infrastructure: The network, server, and database infrastructure form the backbone of the platform, ensuring reliable access to all services.

External Integration: The platform engages with parents, state bodies, and businesses, enhancing communication and collaboration.

This integrated platform aims to dramatically improve students' lives, academics, and professional prospects through a technologically advanced, interconnected education Ecosystem.
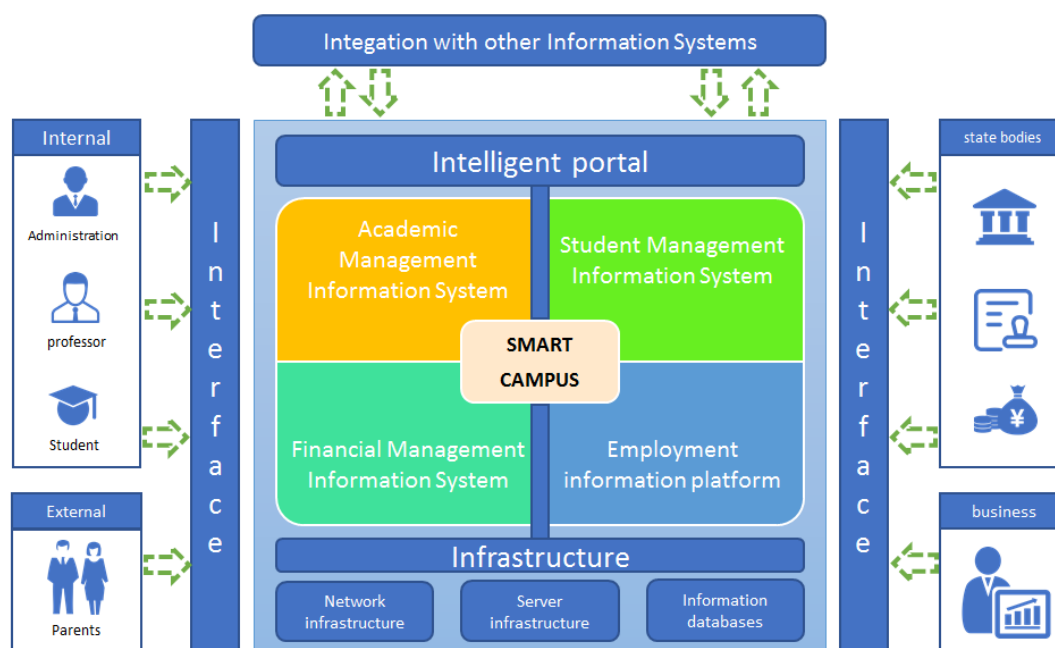
Figure 1: The Smart Campus Platform

Conclusion

This comprehensive study undertaken at Guangdong Vocational College sought to evaluate the efficacy of the Smart Campus Platform in enhancing the academic performance and employability of students. Through a detailed exploration of various facets of this technological intervention, the research unearthed several pivotal findings, which hold profound implications for the realm of vocational education, particularly in the digital age.

Main Findings and Detailed Analysis:

1. Enhanced Academic Performance:A pivotal finding of this study was the marked improvement in students' academic performance following the implementation of the Smart Campus Platform. This platform provided a more engaging and personalized learning environment, which facilitated deeper understanding and retention of course material. The integration of technology in educational delivery was found to be a significant factor in enhancing the learning experience, leading to better academic outcomes. This finding is in line with current educational theories that advocate for personalized learning environments enabled by technology.

2. Increased Employability: Another significant outcome was the increased employability of students who utilized the platform. This facet of the study underscores the platform's role in bridging the gap between academic learning and the practical skills demanded in the job market. The platform provided students with real-world skills that are highly valued by employers, thus enhancing their job prospects upon graduation. This aspect of the study is particularly relevant in the context of vocational education's aim to prepare students for specific careers.

3. Positive Perception and Participation: The study also revealed a high level of satisfaction and positive reception among students, teachers, and administrators. This positive perception is crucial as it underlines the acceptability and adaptability of technological innovations in educational settings. The enthusiastic participation and feedback from these stakeholders suggest a readiness and openness to integrate such advanced platforms in the educational process.

4. Technical Support and Training: The success of the Smart Campus Platform heavily relied on the provision of robust technical support and training. This aspect was pivotal in ensuring smooth adoption and effective utilization of the platform's features. The study highlights the importance of technical support in the successful implementation of technological solutions in educational settings.

Broader Implications：

1. Educational Policy and Practice: The findings from this study advocate strongly for the integration of smart technology platforms in vocational education. This aligns with global educational trends towards more technologically integrated learning environments. The study suggests that similar platforms could be beneficial in other vocational institutions, potentially revolutionizing the standard of education and employability of graduates.

2. Curriculum Development: The results highlight the need for educational content to be in sync with industry trends and market demands. This alignment is crucial for equipping students with the skills that are relevant and in demand, thereby enhancing their job readiness upon graduation.

3. Technological Advancement in Education: The study reinforces the notion that effective use of technology can transform educational experiences, making learning more engaging, efficient, and aligned with the needs of the modern job market.

The study, while providing valuable insights, is not without its limitations. Primarily, its scope was limited to Guangdong Vocational College, which may restrict the generalizability of the findings to other educational contexts or cultures. Additionally, the reliance on self-reported data could introduce biases. The study primarily focused on immediate outcomes, and thus the long-term impacts of the platform remain unexplored.

Future research should aim to address these limitations. Expanding the study to include a diverse range of educational institutions would help in assessing the broader applicability of the findings. Longitudinal studies could shed light on the long-term effects of such platforms on student outcomes. Investigating the integration of such platforms in different cultural and educational settings would provide a more holistic understanding of the role of technology in education on a global scale.

In conclusion, the Smart Campus Platform at Guangdong Vocational College represents a significant advancement in the integration of technology into vocational education. Its impact on both academic performance and employability is a testament to the potential of such platforms to revolutionize educational practices. The study highlights the need for continued research and adaptation to emerging educational and technological trends for the broad adoption and sustained success of such initiatives. The insights from this study are instrumental in guiding future educational policies and practices, not just within vocational education, but across the educational spectrum.

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The Application of TPRS Teaching Method for Chinese as Second Language Students

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Abstract

This study employs the TPRS teaching method to research elementary-level spoken Chinese instruction for foreign learners. It emphasizes moving beyond textbook content and focusing on cultivating students' oral output abilities. The purpose includes of this study were: 1) to applying TPRS in an experimental class for elementary-level spoken Chinese, comparing it with a control class, analyzing whether significant differences exist in oral test scores, assessing TPRS's suitability for basic oral teaching. 2) to assess satisfaction from using TPRS teaching method for Chinese as a second language students . The sample for this study included 44 undergraduate foreign students (aged 18-22) from Sichuan University of Science and Engineering. Students were selected using a simple random sampling technique. Each consisting of 44 students with no significant oral proficiency differences. Post-teaching, oral scores of both groups are compared. The findings showed that 1) Improved oral scores for both classes post-teaching, with significant differences favoring the experimental group, demonstrating TPRS's efficacy in enhancing oral proficiency. 2) The student's level of satisfaction toward the TPRS teaching method was at the highest level. TPRS aids vocabulary acquisition and real-world knowledge application.

Keywords: TPRS Teaching Method, Chinese as a Foreign Language, Basic Oral Instruction

1. Introduction

Oral teaching plays a crucial role in Chinese language learning. Several language education scholars emphasize the importance of oral training for students. Shih Pei-Wen(1983) believes that oral teaching aims to cultivate students' ability to express themselves in Chinese thinking, while Yang Huiyuan (1991)points out that oral skills are key to the vocal expression of phonetics, vocabulary, and grammar. Wang Ruojiang(1999) emphasizes the crucial role of oral skills in teaching Chinese as a foreign language, and Hou Yaguang(2005) highlights that international students need to engage in communication through listening, speaking, reading, and writing. Shen Xiuyan(1996) believes that students need to master the differences between oral expression and written language, and Guo Yingwen(2003) suggests that elementary oral teaching should incorporate everyday communication language. In summary, oral teaching is not only about imparting language knowledge but also an essential way to assess students' proficiency.

TPRS, formerly known as Total Physical Response Storytelling, and later as Teaching Proficiency through Reading and Storytelling since 2004, emphasizes reading and storytelling as the most important ways of language learning.

2. Research Objectives

2.1 To apply the TPRS method in an experimental class for elementary-level spoken Chinese and compare it with a control class, analyze whether significant differences exist in oral test scores, and assess the suitability of TPRS for basic oral teaching.

2.2 To assess the satisfaction of Chinese as a second language students with the use of the TPRS teaching method.

3. Research Hypotheses

3.1. Using the TPRS teaching method in elementary-level Chinese oral teaching results in significant differences in student performance.

3.2. Elementary-level students are satisfied with the effectiveness of the TPRS teaching method for Chinese as a second language.

4. Research Methods

4.1 Population: The sample for this study includes 44 undergraduate international students from Sichuan University of Science and Technology (aged 18-22). Students were selected through simple random sampling, with each class consisting of 22 students, ensuring no significant differences in oral proficiency. Oral test scores were compared between the two groups after the teaching intervention.

4.2 Research Tools Include:

4.2.1. *Teaching Methods to Improve The Oral Chinese Proficiency of Undergraduate International Students at Sichuan University of Science And Technology.*

4.2.2. *Enhancing Chinese Oral Expression Skills Through The TPRS Teaching Method.*

4.2.3. Expert Opinion Questionnaire on the TPRS Teaching Method.

4.2.4. Assessment Test of Oral Proficiency in Chinese as a Second Language Using The TPRS Teaching Method.

4.2.5. Satisfaction Survey Questionnaire on Improving Oral Proficiency in Chinese as a Second Language Using the TPRS Teaching Method.

5. Conclusion

5.1 Results and Discussion of Oral Scores Data

5.1.1 Pre-test Scores in the Experimental and Control Groups

In this study, a pre-test and post-test were administered to both the experimental and control groups, and the data were analyzed using SPSS. As shown in Table 5-1, the experimental group had 22 students, and the control group had 22 students, with a similar number of participants in both groups. The mean score for the pre-test in the experimental group was 59.55 (standard deviation: 12.141), while in the control group, it was 58.91 (standard deviation: 12.428). From the pre-test scores, there was little difference in the oral test scores between the two groups before the experiment, indicating that the two groups had similar oral proficiency levels before the teaching experiment. The independent samples t-test results in Table 5-2 show P = 0.864 (P > 0.05), indicating no significant difference in pre-test scores between the experimental and control groups. This suggests that both groups had similar oral proficiency levels before the teaching experiment and both needed instruction and practice in oral skills.

Table 5-1: Paired Samples T-Test Analysis Results of Pre- and Post-Test Oral Proficiency Scores for Experimental and Control Groups

Variable	Mean	Number of Participants	Standard Deviation
Experimental Pretest	59.55	22	12.141
Experimental Posttest	72.95	22	3.671
Control Pretest	5&91	23	12.428
Control Posttest	66.30	23	5.049

5.1.2 Pre-Post Test Scores in the Experimental and Control Groups

As shown in the table, both the experimental and control groups showed improvement in oral scores after the intervention, with significant differences between the post-test and pre-test scores in the experimental group (P = 0.00, P < 0.05) and the control group (P = 0.007, P < 0.05). This indicates that both groups demonstrated significant improvement in oral scores with the joint efforts of teachers and students. At the elementary stage, students have limited prior knowledge in oral skills, which results in a ceiling effect in oral production. Through learning, students acquired more oral knowledge and practiced oral skills during the oral classes, leading to significant improvements in both groups.

Table 5-2: Independent Samples T-Test Analysis Results of Pre-Test Scores between Experimental and Control Groups

Variable	t-value	Degrees of Freedom (df)	Significance (Sig.)	Experimental Group		Control Group	
				Mean	Standard Deviation	Mean	Standard Deviation
Pretest Scores	.173	43	.864	59.55	12.141	5&91	12.428

Note: $p < 0.05$

However, from Table 5-1, it can be observed that in the post-test scores, the mean score in the experimental group was 72.95 (standard deviation: 3.671), while in the control group, it was 66.30 (standard deviation: 5.049). The experimental group showed an improvement of 13.4 points, while the control group showed an improvement of 7.39 points, indicating a greater improvement in the experimental group. The use of the TPRS teaching method in the experimental group enhanced the students' understanding and retention of the content of the oral classes.

To answer research question one, whether there are significant differences in post-test scores between the two groups, the independent samples t-test results in Table 5-4 show P = 0.00 (P < 0.05). Therefore, it can be concluded that there is a significant difference in post-test scores between the experimental and control groups, with the experimental group scoring higher. The application of the TPRS teaching method significantly improved the oral scores in Chinese as a second language at the elementary level.

In summary, the data analysis results of the experimental and control groups suggest that after one semester of teaching, there is a significant difference in oral scores between the two groups, with the experimental group achieving significantly higher scores. The use of the TPRS teaching method for teaching elementary-level oral Chinese has been successful in significantly improving students' oral scores.

5.2 Differences between the Experimental and Control Groups

The differences between the experimental and control groups can be attributed to the following factors:

Difference in teaching methods: The experimental group used the TPRS teaching method, which emphasizes student engagement, interaction, and comprehensible input, aiding students in better understanding and applying oral knowledge. The control group may have used traditional oral teaching methods, with the difference lying in the choice of teaching methods.

Teaching interaction: The TPRS teaching method enhances students' intrinsic interaction with learning content, interaction between students and teachers, and interaction among students. This interaction helps students better grasp oral knowledge and improve their oral expression skills.

Individual differences in the learning process: Individual differences among students may also lead to differences in oral scores. Some students may be more actively involved in classroom activities, while others may need more time to master oral skills.

In conclusion, the differences between the experimental and control groups are primarily due to the advantages of teaching methods and increased teaching interaction. These factors work together to significantly improve the oral scores in the experimental group. Therefore, the results of this study support the effectiveness of using the TPRS teaching method to enhance elementary-level oral Chinese teaching for Chinese as second language students.

5.3 Significant Differences in Language Learning Satisfaction Between the Two Groups

Student recognition of the positive effects of the TPRS teaching method: Students in the experimental group believe that the TPRS teaching method helps them learn oral skills and greatly assists with vocabulary, while students in the control group may not have had such a positive response.

Advantage in vocabulary acquisition: Students in the experimental group believe that the TPRS teaching method helps them accumulate vocabulary, which aligns with the requirements of elementary-level students who need a substantial foundation in vocabulary learning. Students in the control group may not share the same positive perception.

Individual personalities and emotional handling: Students in the experimental group expressed that they have different emotional responses when answering questions in the TPRS teaching method. Some may feel nervous and require more support and encouragement, while others may feel more confident. This indicates that the TPRS teaching method pays more attention to students' individualities and emotional handling, enhancing engagement in learning.

Storytelling: Students in the experimental group find storytelling to be interesting and helpful in learning oral skills, and the stories do not necessarily have to be lengthy. This demonstrates that storytelling with students as protagonists in the TPRS teaching method increases students' attention to the course content without overwhelming them.

Reading aloud practice: Students in the experimental group believe that reading aloud stories is helpful for learning oral skills and helps them remember the content better. This indicates that reading aloud activities in the TPRS teaching method have a positive impact on oral learning and boost students' confidence in oral skills.

In summary, based on interview results, students in the experimental group generally hold a positive attitude toward the TPRS teaching method, believing it is beneficial for learning oral skills. This may lead to higher language learning satisfaction in the experimental group compared to the control group. However, specific differences need further data analysis and statistical validation to confirm.

5.4 Summary

Through the comparison of pre-test and post-test scores, this study found that the experimental class achieved a significant improvement in oral scores after using the TPRS teaching method, and when compared to the control class, the experimental class scored

higher. This indicates that the TPRS teaching method has a significant educational impact on elementary-level oral teaching. Questionnaires and interviews revealed that students have a positive attitude toward the TPRS teaching method, expressing the following main points and opinions:

Positive attitude and expectations: 72.7% of students in the experimental group reported liking the use of the TPRS teaching method in elementary oral classes, and 81.8% of students expressed the desire to continue using this teaching method in the future. This indicates that students are highly positive about the TPRS teaching method and anticipate benefiting from it in their future learning.

Positive impact of reading aloud: Students recognize the reading aloud component in the TPRS teaching method and believe that reading stories improves the fluency of oral expression and enhances their memory of the content. This suggests that reading aloud is an effective teaching method that helps improve students' oral skills and learning motivation.

Advantages in vocabulary learning: Students generally believe that the TPRS teaching method is more helpful in phonetics, vocabulary, and grammar, aiding in vocabulary acquisition. The creation of authentic story scenarios by teachers is seen as helpful in clarifying learning objectives, and teacher feedback aids in better understanding vocabulary meanings.

In summary, based on data and student feedback, the TPRS teaching method has been successful in elementary oral teaching, improving student performance, stimulating learning interest, enhancing vocabulary learning, and improving oral expression skills. Students generally perceive this teaching method as having a positive impact on their learning experience, making the continued use of the TPRS teaching method in elementary oral classes reasonable and beneficial for students in improving their oral skills.

5.5 Discussion

Implementing the TPRS teaching method for elementary oral teaching requires teachers to pay attention to the following key points:

Control classroom pace and diversify questioning methods: Teachers should be able to flexibly manage the classroom process, encourage active student participation through various questioning methods, intonation, facial expressions, and gestures, and avoid mechanical responses to questions. Students should understand that answering questions is about supplementing story details rather than simple sentence substitution.

Summarize grammar structures: Depending on students' age and needs, teachers should summarize grammar structures after the story. Adult learners may require more grammar explanations, while child learners may benefit from practical grammar understanding.

Streamline story content: When creating stories, teachers should ensure clear chapter structures and avoid overly lengthy story texts. Providing both pinyin and non-pinyin versions of the story for student learning is important. Story texts should be clear and concise for easy understanding and memorization.

Guide the rhythm and intonation of reading aloud: Teachers should pay attention to students' reading rhythm, intonation, pauses, and encourage various ways of presenting their achievements, such as retelling stories and role-playing, to help students better understand and apply oral knowledge.

Ensure coherence and progression: Teachers should ensure that teaching activities are coherent and progress sequentially, making full use of the cyclical input in the TPRS teaching method to promote students' oral expression and comprehension skills.

In conclusion, when using the TPRS teaching method, teachers should flexibly control the classroom pace, summarize grammar structures, streamline story content, guide the rhythm and intonation of reading aloud, and ensure coherence and progression in teaching activities to improve students' oral expression skills and comprehension levels. These key points help effectively implement the TPRS teaching method and enhance the quality of oral teaching.

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Augmented Reality Technology on Chinese Vocabulary Teaching for International Undergraduate Students

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Abstract
Studying basic Chinese as a foreigner poses challenges rooted in unfamiliarity with the language's characters and tones, compounded by cultural differences. These obstacles require state-of-the-art learning material which encourages participation, stimulates attention, and retains the learner's enthusiasm. This study deployed an active learning approach, examined the primary challenges faced by international students in Chinese character cognition, and proposed the utilization of Augmented Reality (AR) technology in teaching Chinese vocabulary to address these difficulties. The research employs various methods to collect data, such as tests, surveys, interviews, and classroom observation records. Through comprehensive analysis of these data, the effectiveness of AR technology in Chinese vocabulary teaching is thoroughly investigated. The purposes of this study were: 1) to compare the pre-test and post-test results of students' Chinese vocabulary learning when AR technology is employed and 2) to assess students' satisfaction with the application of AR technology in Chinese vocabulary teaching. The research focuses on 35 undergraduate international students at Sichuan University of Science and Engineering. The findings reveal: 1) the student's achievement based on the average score of the post-test was higher than the pre-test significantly, and 2) AR-enhanced vocabulary teaching enhances teaching effectiveness, stimulates students' learning interests and enthusiasm, fosters increased interaction and communication among students and between students and teachers, thus aiding students in mastering vocabulary more effectively.

Keywords: Augmented Reality Technology, Chinese Language Teaching, Vocabulary Teaching, Action Research

1. Introduction

With the burgeoning development of China's economy, an increasing number of foreigners are delving into learning Chinese. Within Chinese teaching, vocabulary and its instruction have garnered significant academic interest. The efficacy of vocabulary instruction directly impacts learners' proficiency in Chinese. Chinese harbours an extensive lexicon, necessitating an optimized design for vocabulary teaching to aid students in better word retention. It's imperative to synthesize experiences and refine vocabulary teaching methodologies continually.

Several innovative teaching methodologies have emerged amid the seamless integration of information technology, intelligent techniques, and pedagogy. Augmented Reality (AR) technology, capable of creating immersive virtual three-dimensional environments, seamlessly blends the virtual and tangible in education. Consequently, Bistaman et al. (2018) posit that AR substantially stimulates students' interest, bolsters enthusiasm, enhances learning efficiency, and catalyzes innovative teaching methodologies.

Presently, research on the application of AR technology in language instruction spans multiple languages, including Chinese, English, Thai, and others. In Chinese instruction, Prontip (2015) integrated AR technology for teaching Chinese vocabulary, yielding improved learning efficiency and heightened student motivation. Uiphanit et al. (2020) developed a mobile AR application for enhancing Chinese vocabulary learning for students who learn Chinese as a main subject, significantly improving their learning capabilities. Similarly, in Thai language instruction, Vongsripeng (2011) applied AR technology to teach Thai letters, enhancing learning efficiency and deepening students' comprehension and retention of Thai characters. In English instruction, Shaumiwaty et al. (2022) incorporated AR technology in primary school English classes, bolstering the teaching effectiveness of English literacy and pronunciation. Gawale et al. (2018) leveraged AR for English animal vocabulary instruction in Thai kindergartens, rendering abstract content vivid and comprehensible. Moreover, Meksamoot et al. (2017) designed electronic teaching materials for complex Thai consonants, improving learning efficiency and speaking prowess, thereby fostering student interest.

The exploration and evolution of AR technology in teaching diverse languages have spotlighted its potential in modern Chinese vocabulary instruction. While a few researchers have explored AR-based Chinese vocabulary teaching, complete teaching practices and detailed methodologies, models, and evaluation indicators remain scarce. Cai et al. (2022) pointed out that in language classes, AR applications should not be restricted to a specific instructional strategy only but be used diversely. Wen et al. (2021) highlighted that the research on integrating pedagogical designs with AR in language learning is less mature.

Hence, this study centers on Chinese vocabulary instruction for international students, undertaking action research by employing AR technology in Chinese vocabulary teaching. Devising a teaching blueprint leveraging AR technology alongside existing teaching materials, this study orchestrates AR Chinese vocabulary sessions for international students. A comprehensive survey and interviews evaluate the application's impact in Chinese vocabulary instruction.

The key contributions and significance of this research are outlined as follows:
  (1) Exploring teaching strategies and models compatible with AR technology in vocabulary instruction, fostering diversified approaches to vocabulary teaching.

(2) Pioneering the application of AR technology to innovate Chinese vocabulary instruction, fostering the evolution of Chinese pedagogy, and enriching digital resources for Chinese instruction.
(3) Within the information education landscape, utilizing AR technology as a blueprint for the reform of Chinese instruction.

2. Research Methodology

The primary research methodologies employed in this study encompass action research, questionnaires, and interviews.

(1) Action Research Method
The action research process involves several stages: firstly, formulating an action plan; secondly, implementing practical research; thirdly, assessing the exercise impact; fourthly, reflecting upon and refining the action plan; fifthly, re-implementing the program; sixthly, observing the outcomes; and finally, reflecting on the entire process. Through these steps, we conduct action research into the application of AR technology in Chinese vocabulary teaching. We aim to summarize experiences and shortcomings, propose improvement measures and recommendations, and derive conclusive findings that can substantiate the utilization of AR technology in Chinese vocabulary teaching.

(2) Questionnaire Survey Method
Upon the completion of the teaching period, an electronic questionnaire will be distributed among the teaching subjects to evaluate the effectiveness of AR technology in Chinese vocabulary teaching. This survey aims to analyze the impact of AR technology on Chinese vocabulary teaching effectiveness and gather students' feedback.

(3) Interview Method
Throughout the teaching process, interviews were conducted to gather teachers' perspectives on the effectiveness of AR technology in vocabulary teaching. These interviews aimed to analyze the challenges and potentialities associated with integrating AR technology into vocabulary teaching. Additionally, interviews with students using AR technology for Chinese vocabulary learning aimed to discern genuine classroom experiences, learning conditions, emotional shifts, and altered learning attitudes facilitated by AR technology.

3. Research Subjects

The subjects of this research encompass international undergraduate students enrolled in Chinese studies at the Sichuan University of Science and Engineering in China. The class consists of 35 students, 17 boys and 18 girls, aged between 17 and 19, with an elementary-level Chinese proficiency. Among them, three have successfully passed the HSK Level 3 exam. Most students have pursued Chinese language studies for over three years, commencing during their first year of high school. Each year, students engage in two courses—basic Chinese and vocational Chinese—amounting to 240 learning hours annually. The study involved action research on Chinese vocabulary teaching utilizing AR technology, spanning 19 weeks with four classes per week, each session lasting 50 minutes.

4. Research Design

(1) Research Process

This research focuses on Chinese vocabulary teaching and conducts action research on the application of AR technology in teaching Chinese vocabulary to international students. Initially, we used ZAPPAR software to design AR vocabulary teaching courseware. A targeted design for AR technology in Chinese vocabulary teaching was developed based on student materials, and teaching practices were implemented accordingly. The action research methodology was employed to continuously observe, reflect, and adjust teaching strategies throughout the process, providing a realistic record of the teaching practice. The actions in this study are divided into two rounds. The initial one spans the first ten weeks, encompassing 30 lessons. Pre-testing was conducted before its initiation. After completing AR-based Chinese vocabulary lessons, students underwent test assessments and post-testing to gather pertinent data. Synthesizing and reflecting on outcomes from the initial phase laid the groundwork for executing the second phase. According to the first-round results, the next one further adjusted and created AR-based vocabulary teaching materials. The second post-testing was conducted at the end of the second round. Subsequently, a combination of questionnaire surveys and interviews was employed to assess the impact of AR technology on vocabulary teaching. The primary research objectives of this article can be categorized into the following four aspects:

1) Designing a teaching plan for implementing AR technology in vocabulary teaching, grounded in the existing teaching materials.
2) Implementing action research methods to teach Chinese vocabulary using AR technology.
3) Gathering student feedback on the effectiveness of AR technology application in vocabulary teaching through questionnaires.
4) Conducting interviews with a Chinese teacher and students utilizing AR technology for learning Chinese vocabulary at school.

(2) Test Design

This research incorporated three evaluations: a pre-testing administered before the teaching interventions, a post-testing after the initial teaching action round, and a subsequent post-testing following the completion of the second round. Table 1 provides comprehensive details regarding these evaluations. Employing a systematic sampling approach, we selected ten vocabulary words per lesson, amounting to 80 words in total. Across the three assessments, there were a combined 80 questions. The compilation of vocabulary test items primarily assessed three facets: pronunciation/intonation, word meanings, and word forms, aiming to gauge students' grasp of the vocabulary.

Table 1: The specific details of three consecutive tests

Testing	Number of items
Pre-testing	A total of 40 questions
Post-testing after the first round of action	A total of 20 questions
Post-testing after the second round of action	A total of 20 questions

(3) Questionnaire Survey

After completing the second round of instructional interventions, a questionnaire survey is administered to students involved in AR-based Chinese vocabulary instruction. Structured on the Likert five-point scale, the questionnaire encompasses diverse aspects, including:

1) Basic personal information, such as ethnicity, gender, age, proficiency in the Chinese language, and duration of Chinese language learning.
2) Current utilization status of AR technology (1 item).
3) Students' experiences with AR usage (2 items).
4) Emotional attitudes of students (6 items).
5) Students' learning outcomes (7 items).

(4) Interviews

To further explore the implementation of AR in Chinese vocabulary instruction, students' experiences with AR, their attitudes, and detailed recommendations are investigated through post-teaching session interviews.

A total of 10 students were interviewed, comprising five males and five females. The interviews, lasting over 10 minutes each, were conducted face-to-face and over the telephone, encompassing two face-to-face sessions and eight telephone interviews.

These semi-structured interviews involved the author using prepared outlines before the sessions. The outlines were designed based on student's learning experiences and additional information needed from the questionnaire survey, encompassing a total of 6 questions. The interview outlines are provided in Appendix 5, featuring the following specific questions:
1) What vocabulary teaching methods are you familiar with?
2) What are your perspectives on using AR technology for vocabulary learning?
3) What are your most prevalent challenges when learning vocabulary using AR technology?
4) How do you address these challenges? Please share your insights.
5) What advantages have you encountered in learning vocabulary with AR technology?
6) Following the use of AR technology in vocabulary learning, what guidance and recommendations would you offer to the teacher?

5. Results and Discussion

(1) Analysis of Pre- and Post-test Scores Before and After the First Round of Actions

Figure 1 demonstrates a notable contrast between the pre- and post-testing overall scores among students following the initial round of action. The discernible increase in overall scores post the first round signifies the efficacy of AR in vocabulary instruction. Further scrutiny of student learning outcomes, specifically in word form, pronunciation, and meaning, unveils a significant enhancement in 'Form' and 'Meaning' scores between the pre and post-tests after the initial round of action. However, there's no marked improvement in 'Pronunciation' scores. This suggests that AR-based teaching in the initial round has had a restricted impact on students' proficiency in word pronunciation. Consequently, the focus will be on assessing the efficacy of AR in teaching Chinese word pronunciation during the second round of instructional actions.

(2) Analysis Of Pre- and Post-Test Scores Before and After the Second Round of Actions

Figure 2 illustrates a notable disparity between the pre- and post-testing overall scores among students after the second round of action. There's a marked enhancement in the overall scores of students before and after the second round of action, underscoring the efficacy of AR in vocabulary instruction. Further scrutiny of student learning outcomes concerning word form, pronunciation, and meaning unveils a noteworthy improvement in 'Form' and 'Pronunciation' scores in the pre and post-tests following the second round of action. However, there's no

substantial improvement in 'Meaning' scores. This indicates that AR-based teaching in the second round constrains students' command over word meanings. Thus, the author suggests that refining AR-based vocabulary instruction should prioritize enhancing the efficacy of AR in teaching Chinese word meanings.
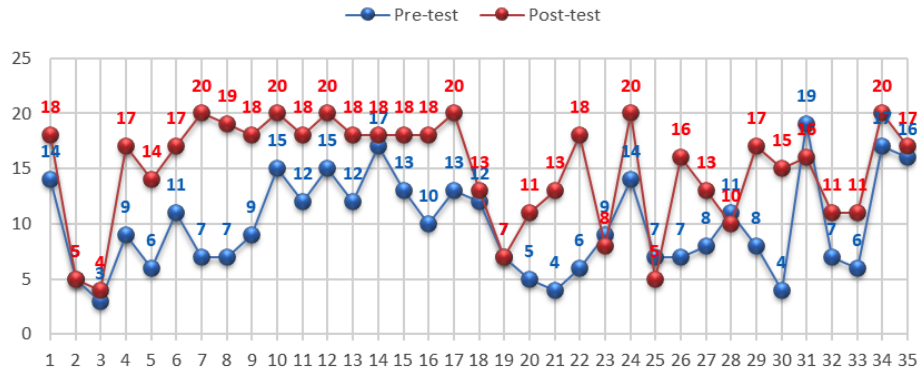
Figure 1: Analysis of pre- and post-test overall score differences in the first round
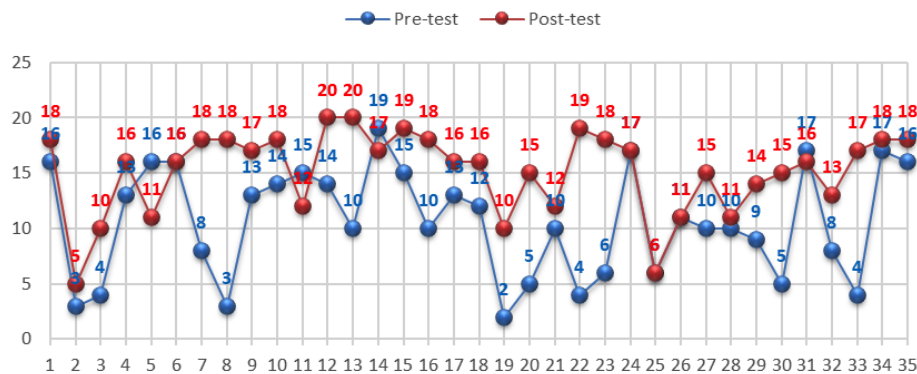
Figure 2: Analysis of pre- and post-test overall score differences in the second round

(3) Analysis of Questionnaire Survey

The questionnaire survey encompassed 35 students engaged in AR-based Chinese vocabulary teaching. All 35 questionnaires distributed were collected, resulting in a 100% response rate, with 35 questionnaires deemed valid, indicating a 100% validity rate. Regarding prior AR technology usage, survey results revealed that 97.1% of students hadn't previously utilized AR or similar technologies in their Chinese language learning endeavours. In comparison, only 2.9% had some exposure to similar tools. This implies a relatively limited integration of AR technology in current Chinese language teaching practices. Regarding students' experiences with AR, survey findings showed that 57.1% of students found AR technology easy to operate, with 31.4% strongly agreeing. Only 11.5% expressed some uncertainty about its usability, indicating that most students perceive AR technology as user-friendly. Additionally, 54.3% agreed that AR technology enhances students' engagement in classroom activities, with 40% strongly agreeing. Conversely, a minority (5.7%) were somewhat uncertain. Notably, a few students encountered network issues, limiting their participation in class activities and contributing to a perception of AR technology as cumbersome among some students.

Figure 3 illustrates the impact of AR technology on word form, meaning, and pronunciation connections among students. Concerning the relationship between word form and meaning

facilitated by AR, 51.4% of students acknowledge its assistance in establishing these connections. Among them, 28.6% strongly agree, while 17.1% remain uncertain, and 2.9% disagree. This highlights AR's role in deepening students' understanding of vocabulary by associating word form with richer semantic content. Regarding connecting word form with pronunciation through AR, 57.1% of students express that AR aids in this association, with 28.6% strongly agreeing and 14.3% remaining uncertain. This demonstrates AR's capacity to link word characteristics with correct pronunciation, thereby enhancing reading fluency. Regarding pronunciation and meaning connections through AR, 57.1% of students believe it facilitates this association, with 31.4% strongly agreeing and 11.5% expressing uncertainty. AR notably assists in comprehending diverse meanings of words or phrases within varying contexts, aiding students in learning polysemous words. Notably, AR is observed to be most effective in linking pronunciation with meaning, followed by word form and pronunciation, and finally, word form and meaning.
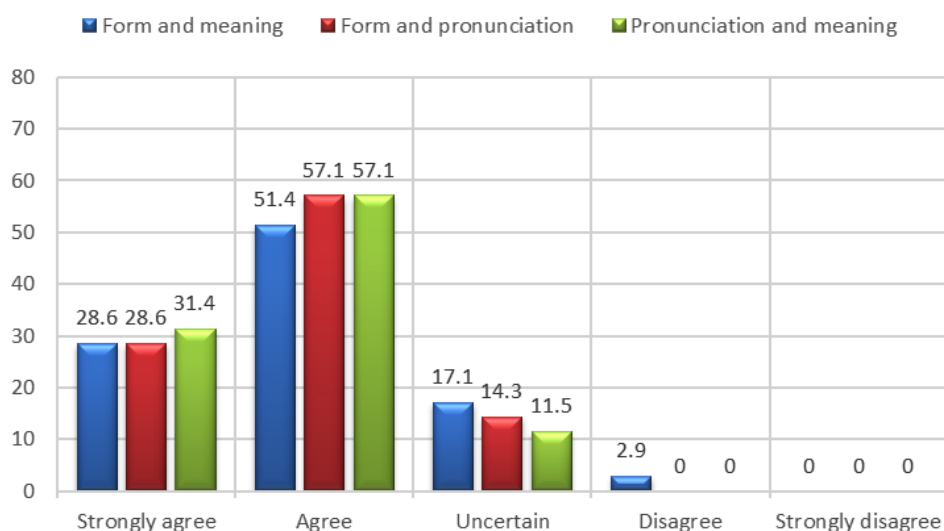
Figure 3: Analysis of using AR to help students establish connections between word form and meaning, word form and pronunciation, and pronunciation and meaning
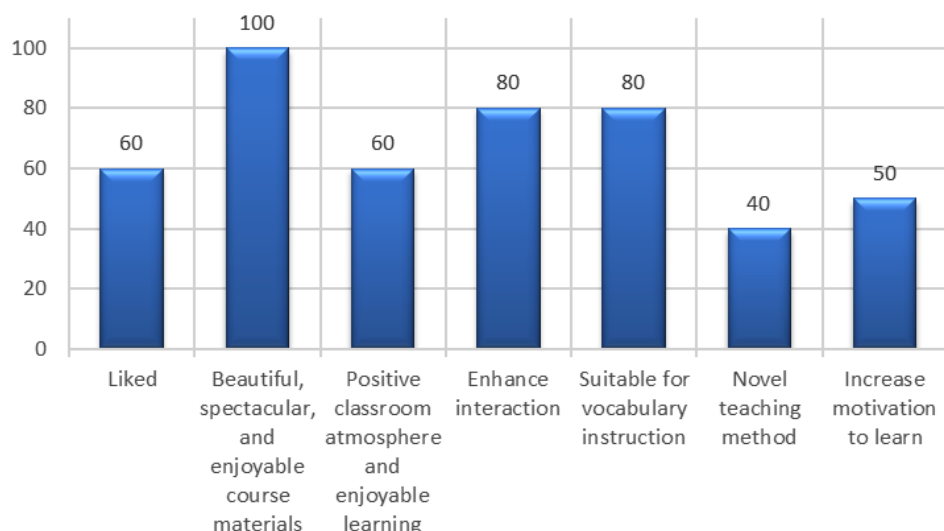
Figure 4: Students' perspectives on using AR for Chinese vocabulary learning

(4) Analysis of Interview Findings

Figure 4 portrays interview insights revealing unanimous student appreciation for AR course materials, with 100% of respondents describing them as visually appealing, remarkable, and enjoyable, offering a refreshing departure from conventional blackboard-based instruction. Moreover, 80% of students highlight AR's effectiveness in fostering student engagement, deeming it apt for vocabulary instruction. Additionally, 60% express a genuine fondness for AR-based learning, attributing it to creating a positive classroom ambience and enjoyable learning encounters. Half of the students (50%) perceive AR as a motivational tool for Chinese language acquisition, while 40% regard it as an innovative instructional approach. These findings collectively affirm that students universally recognize and appreciate AR-based instruction's engaging and enjoyable nature.

6. Conclusion

After conducting two teaching cycles and analyzing various materials and data collected during the instructional process, this study has yielded several conclusions regarding the implementation of AR in Chinese vocabulary education.

(1) Boosting Student Motivation

Through interviews, questionnaires, tests, and assessments of student assignments, it was evident that AR-based instruction effectively alleviates the monotony often associated with traditional teaching methods. AR engagement fosters a robust vocabulary foundation among students, heightens their classroom involvement, and cultivates positive interactions between teachers, students, and peers. Consequently, students exhibit increased enthusiasm and initiative in their learning endeavours. Notably, when encountering challenging tasks, students proactively seek solutions or guidance from teachers to stay on par with their classmates.

(2) Sparking Students' Interest And Drive to Learn

Action research, including student interviews and assignment evaluations, demonstrated a considerable surge in students' enthusiasm for learning Chinese vocabulary. The amalgamation of AR and real-world elements ignites students' interest and augments their intrinsic motivation, resulting in heightened attentiveness and engagement. In the classroom, students display diligence, active participation in class exercises, and completion of AR-related learning tasks, yielding commendable outcomes for AR-based instruction.

(3) Improving Learning Outcomes and Academic Performance

Two action research cycles revealed significant improvements in Chinese vocabulary acquisition in form, pronunciation, and meaning. This also suggests a positive correlation between AR instruction and enhanced Chinese language proficiency. AR-based vocabulary instruction solidifies students' vocabulary comprehension and bolsters their understanding of word forms, pronunciation, and meanings, enhancing overall Chinese language learning performance.

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The Effects of the Flipped Classroom Model on Pre-university Students' Academic Performance and Learning Outcomes

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Abstract

This study investigates the implementation and impact of the flipped classroom model (FCM) on Year 12 pre-university students at one of the six form centres in Brunei Darussalam. Traditional pre-university education often revolves around time constraints to cover syllabi and prepare students for board examinations, leading to a reliance on conventional transmission-based teaching methods. However, the evolving educational landscape calls for a transition towards flexible, student-centred pedagogies. The FCM, an innovative iteration of student-centred learning, emerges as a potential avenue for facilitating this transition. Despite its potential, the application of FCM in pre-university education is relatively new, and its effectiveness across diverse subjects remains unexplored. To evaluate the efficacy of FCM in pre-university teaching and learning, a quasi-experimental design was employed across various A-Level subjects. Pre- and post-test scores were collected and analysed using independent sample and paired sample t-tests. Findings exhibit a substantial improvement in students' post-test performance across all subjects compared to their respective control groups. Furthermore, this study unveils positive effects of FCM on student learning outcomes, particularly in terms of independence, engagement, and collaborative attitude. Interestingly, no significant differences in mental effort and academic stress were reported between FCM and control groups. The accrued favourable outcomes underscore the potential of FCM as a contemporary and effective pedagogical model to be adopted in pre-university settings, contributing to enhanced teaching and learning approaches. This study thus advocates for the incorporation of FCM into pre-university education based on its observed benefits.

Keywords: Flipped Classroom Model, Quasi-experimental Design, Academic Performance, Learning Outcomes

Introduction

The origins of the Flipped Classroom Model (FCM) can be traced back to the innovative work of Jonathan Bergmann and Aaron Sams, chemistry educators in the United States. In 2007, their integration of explanatory content and the utilisation of recording software to create instructional videos marked a paradigmatic shift in educational practices, garnering widespread acclaim within the educational community. Subsequently, the FCM transcended geographical borders, becoming a globally recognised educational methodology.

The advantages of enabling students to learn independently, using online resources, and engaging in classroom activities have been extensively documented in several studies (Goodwin & Miller, 2013; Plunkett & Beckerman, 2014; Sams & Bergmann, 2014). This shift towards student-centered pedagogy not only offers insights into student learning preferences and challenges but also enhances the quality of classroom interactions. It emphasises active student participation, fosters critical thinking abilities, and boosts digital literacy, prompting educators to move away from conventional teacher-centered methods (Wright, 2022).

However, despite the evident advantages in skill enhancement and active engagement, persistent challenges, often associated with teachers, students, or technological demands, remain prevalent. Agung et al. (2020) highlighted technology-related barriers, where numerous students expressed disinterest in online learning due to limited internet access and inadequate technological resources, underscoring the issue of the digital divide. The abrupt shift to e-learning since 2020 uncovered tangible limitations, including an excessive dependence on technology functionality and the absence of interpersonal contact during out-of-class learning, contrasting starkly with traditional teaching settings (Clark-Wilson et al., 2020; Goksu and Duran, 2020).

Continuous research and ongoing reflection remain crucial for effectively integrating this innovative model within ever-evolving learning settings. This research endeavour seeks to enhance comprehension and tailor technology integration methods to adeptly address the evolving needs and dynamic demands of learners, particularly within the context of pre-university education.

Research Questions

The primary emphasis of this study revolves around two key research questions (RQ).
    RQ1: What are the effects of FCM on students' learning?
    RQ2: Does the extra workload in FCM affect students' learning?

Methodology

Quasi-experimental Design

The research involved students from Year 12, spanning various subjects including Chemistry, English/General Paper, History, Mathematics, and Psychology. The methodology integrated asynchronous learning strategies incorporating interactive resources such as pre-recorded video lectures and multimedia activities. These materials were supplemented by accountability quizzes or summaries, reinforcing independently acquired knowledge at home.

The educational content primarily targeted lower-order thinking skills in alignment with the revised Bloom's taxonomy.

During in-class sessions, students engaged in activities geared towards grasping the learning material, emphasising the refinement of advanced thinking abilities through collaborative group work. The experimental phase spanned three cycles, culminating in the presentation of the final cycle's outcomes. To assess mental effort and academic stress levels, students were exposed to one of three teaching models: the original Flipped Classroom Model (oFCM), the extended Flipped Classroom Model (eFCM), or the Traditional Classroom Model (TCM).

The research utilised a pre-test/post-test quasi-experimental setup to evaluate the influence of FCM on students' academic performance. This involved comparing two groups: one undergoing FCM (the experimental group) and the other receiving TCM instruction (the control group). With a participant pool of 201 students, the study sought a thorough analysis of FCM's effectiveness compared to traditional teaching. Before any instruction, both groups completed a pre-test to establish their initial knowledge or skills. Following the instructional period - where the experimental group experienced FCM and the control group received traditional teaching - a post-test assessed the progress of each group's learning. This design, backed by a substantial sample size, aimed to yield robust data for effectively evaluating FCM's impact on student performance and enabling valid instructional comparisons.

Furthermore, the study employed a comparative method to evaluate how FCM affected students' mental effort and academic stress. It compared results between students exposed to FCM in experimental groups and those taught using TCM in control groups. The oFCM adhered to standard procedures involving out-of-class assignments and active in-class learning sessions. In contrast, the eFCM integrated adjustments based on feedback and formative assessments from both out-of-class and in-class activities. Teachers flexibly adapted their teaching strategies, leveraging both in-class and out-of-class activities to enhance the overall learning experience for students.

Survey

The surveys were administered to participants involved in RQ1 (n = 201) and RQ2 (n = 46, 56, 32, 65, and 55 for Chemistry, General Paper, History, Mathematics and Psychology respectively).

Data Collection & Analysis

A comprehensive assessment approach was employed for data collection. Pre- and post-tests were utilised to quantify student learning outcomes, while pre- and post-surveys were conducted to elicit qualitative feedback on their FCM experiences. For the comparative analysis assessing the influence of FCM on students' mental effort and academic stress scale questionnaires were administered to students following the conclusion of the oFCM, eFCM, and TCM instructional approaches.

The pre- and post-tests were analysed using independent sample t-tests. Effect sizes (Cohen's *d*) were computed for each statistically significant inferential analysis. Descriptive statistical analysis was applied to the questionnaire survey (Zhao & Li, 2021), while the mental effort (Paas, 1992) and academic stress scale (Bedewy & Gabriel, 2015) surveys were subjected to one-way ANOVA.

Results

There Is a Significant Increase in the Mean Gain Scores of FCM Classrooms

The statistical analysis, conducted through an independent sample t-test to assess mean score gains, yielded statistically significant results. The post-test scores in FCM classes exhibited a substantial increase when contrasted with those in TCM classes (Figure 1). This empirical evidence strongly supports the notion that students exposed to the FCM approach experienced markedly enhanced growth and comprehension of the subject matter.
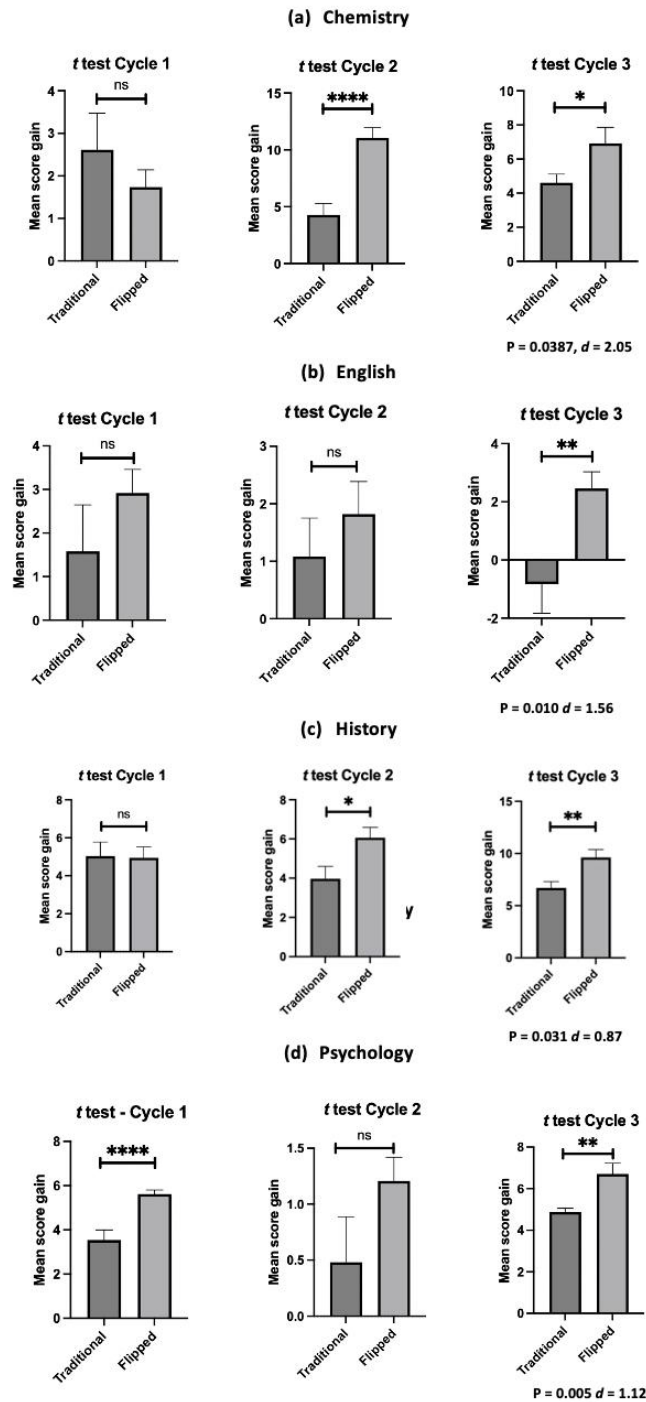
Figure 1: The independent sample t-test reveals a breakthrough of significance in the second or the third cycle of FCM implementation.

During the third cycle of FCM implementation, the independent sample t-test indicates a notable distinction between the FCM and TCM groups This implies that, in this cycle, FCM classes had a more pronounced impact on the measured outcome compared to traditional classes. This change might be attributed to several factors. Students in the FCM classes could have grown more accustomed to FCM concepts and approaches, resulting in enhanced performance. Additionally, teachers might have refined their instructional techniques in the FCM classes over time, better engaging students and aiding their comprehension of the material. This underscores the likelihood that FCM principles require a cumulative understanding, gradually developed over time, with the third cycle possibly representing the point at which both students and teachers had fully adapted to this teaching and learning model.

The noteworthy high effect size in the FCM groups signifies a substantial impact on the studied outcome. This measure assesses the strength of the relationship or difference between groups. In FCM's context, a high effect size implies meaningful and significant changes, not just minor alterations. This indicates a considerable improvement in student performance or the specific variable studied. Moreover, high effect sizes in FCM not only hold statistical significance but also practical importance, suggesting notable improvements in learning outcomes due to FCM. Additionally, a high effect size reinforces FCM's ability to predict or explain changes, establishing a strong, reliable relationship between FCM and outcomes. It signifies a clear distinction between FCM and other methods or interventions, enhancing the study's statistical power and result reliability.

FCM Resulted in a Range of Positive Learning Outcomes

Furthermore, the investigation uncovers a range of positive learning attitudes stemming from students' engagement with the FCM. By analysing survey data (adapted from Zhao & Li, 2021) and conducting in-depth semi-structured interviews with students, valuable insights into the transformative effects of FCM were gained on various aspects of their learning experience.

Importantly, FCM appeared to enhance students' self-regulation which is their ability to manage and control their own thoughts, emotions, behaviors, and actions in order to achieve specific goals as well as their self-efficacy, indicating that they developed a stronger belief in their ability to comprehend and excel in their studies (Table 1). This newfound confidence could potentially lead to greater academic achievements and a more positive outlook on their educational journey. In addition, FCM fostered greater independence among students. They reported a heightened sense of autonomy in managing their learning, which can be attributed to the self-paced nature of FCM. This increased autonomy empowers students to take charge of their education, making them more self-reliant learners. Moreover, our findings revealed that FCM promoted collaboration among students. The interactive elements of FCM, such as group discussions and collaborative projects, encouraged students to work together effectively. This not only enhanced their social and teamwork skills but also enriched their learning experiences through shared insights and perspectives. Lastly, FCM was associated with heightened engagement in the learning process. Students expressed increased enthusiasm for their studies and a deeper involvement with the subject material. This heightened engagement can lead to more meaningful and long-lasting learning outcomes. These emerged themes were corroborated through semi-structured interview of students.

Table 1: The emerging positive learning outcomes of FCM as perceived by students.

Constructs	Question	Median	Mean	Mode
Self-regulation	I am willing to adjust my learning strategy to meet the learning objectives of the topic.	4	3.76	4
	I usually choose a comfortable place when completing the home assigned learning tasks.	4	4.18	5
	I know where I can learn/ complete the home-assigned learning tasks efficiently.	4	3.76	4
	I try to take more thorough notes when learning the out-of-class learning tasks.	4	3.61	4
	I try to overcome the distraction when watching video lectures/online videos.	4	3.70	4
	I seek help from classmates when meeting difficulties in learning/ completing out-of-class learning tasks.	4	3.81	4
Resources/ Independence	Out-of-class learning tasks equipped me to broaden the knowledge.	4	3.58	4
	Out-of-class learning tasks improved my English listening skill.	4	3.56	4
	With out-of-class learning tasks, I improved my independent learning.	4	3.67	4
Self-efficacy	I am confident in socially interacting with other students with respect.	4	3.87	4
	I developed friendship with my classmates.	4	3.87	4
	I am confident in my ability to complete all my out-of-class learning tasks.	4	3.54	4
Collaboration	I enjoy the collaboration experience in the in-class activities (pair-work/group work).	4	3.45	4
	I learned a lot from my in-class activities (pair-work/ group-work).	4	3.66	4
	Pair work/ group work enhanced my communication with classmates.	4	3.80	4
	The experience of cooperating with my partner/ group is pleasant.	4	3.62	4

In essence, the research indicates that FCM positively influences students' learning attitudes in multiple ways. It bolsters self-regulation, self-efficacy, promotes independence, fosters collaboration, and heightens overall engagement in learning. Ultimately, it contributes to more successful and rewarding educational experiences for students. The findings emphasise that FCM significantly enhances students' learning outcomes. This enhancement is evident through increased test scores (improved academic performance) and a deeper grasp of the subject matter. Students exposed to FCM demonstrate marked improvements in knowledge and skills compared to those in traditional classroom setups. Furthermore, our research underscores that FCM actively involves students in the learning process. This involvement is apparent through heightened participation in class discussions, collaborative activities, and exercises that encourage critical thinking (Findlay-Thompson & Mombourquette, 2014). The FCM transforms students from passive recipients of information to active contributors in their own educational journey. This shift in engagement holds significant value in modern education, where interactive and participatory learning experiences are highly prized.

FCM Does Not Impose Extra Mental Effort or Academic Stress

In educational research, understanding how instructional models such as FCM impact students' academic stress and mental effort holds great importance. To investigate this, researchers commonly use questionnaire scales crafted to capture students' perceptions, emotions, and encounters within their learning settings. Academic stress can manifest in various forms, including feelings of being overwhelmed, anxious, or pressured by coursework and learning tasks (Bedewy and Gabriel, 2015). Researchers employ these scales to gauge students' self-reported stress levels, covering aspects like stress-related feelings, time constraints, workload, and the overall perceived stress linked with a specific instructional approach.

Within the learning context, mental effort refers to the cognitive exertion needed to process information and engage in educational tasks, varying based on task complexity and the learning environment. Scales measuring mental effort typically include items relating to concentration, cognitive load, and perceived mental workload. This study investigated how oFCM and eFCM impact mental effort and academic stress compared to the TCM approach, utilising established scales (Paas, 1992; Sweller, 2018).

To evaluate if the increased workload resulting from oFCM and eFCM contributed to increased mental effort and academic stress among students, a one-way ANOVA analysis was performed. This analysis utilised students' feedback obtained through surveys measuring mental effort and academic stress after they completed lessons in TCM, oFCM, and eFCM. The results indicated that there were no statistically significant differences in mental effort and academic stress when implementing FCM (encompassing both oFCM and eFCM) in classroom settings compared to the TCM approach (Figure 2).

(a) Academic stress
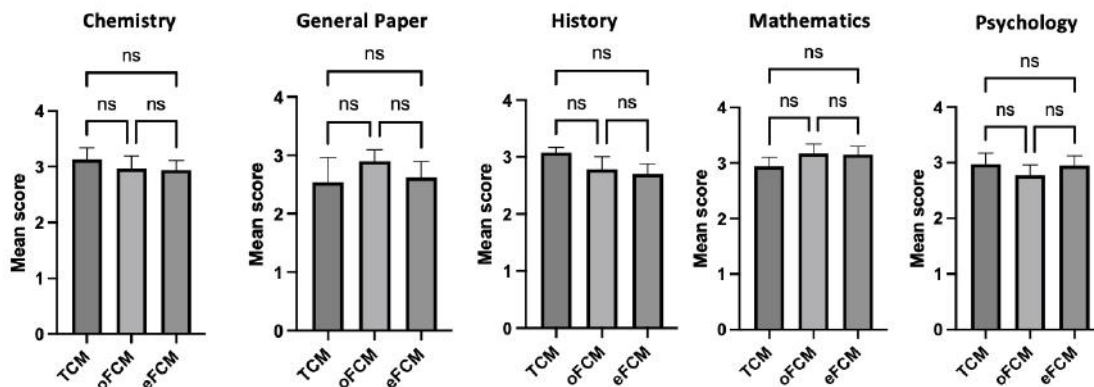
(b) Mental effort
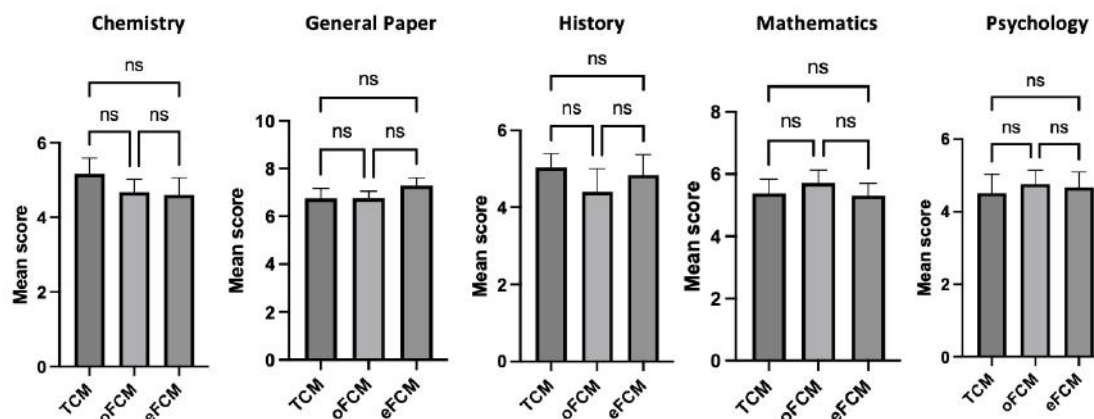
Figure 2: One-way ANOVA indicated that there is no significant difference in terms of students' (a) academic stress and (b) mental effort in the three instructional models.

The absence of significant differences suggests that implementing FCMs does not inherently increase students' academic stress levels compared to traditional teaching methods. This is beneficial as lower stress can promote a healthier learning environment. Additionally, the study implies that students can manage the mental effort needed in FCM without facing notably higher cognitive load. This indicates a viable transition to FCM without overwhelming students. These findings support FCM as a flexible, student-centered approach where students engage with materials at their own pace, potentially easing the constraints of fixed class schedules. With potentially lower academic stress and manageable mental effort in FCM, this could foster a more conducive environment for comprehensive understanding and improved learning outcomes.

These results suggest that FCM can be integrated as an alternative teaching approach without imposing additional academic stress or excessive mental exertion on students. This serves as a positive outcome, offering educators an effective teaching method that encourages active and self-directed learning while upholding a comfortable learning environment for students. This illuminates the practical implications of embracing FCM within educational environments.

Conclusions

In conclusion, this study strongly affirms the positive influence of FCM on students' academic performance and learning attitudes. FCM cultivates crucial 21st-century skills such as self-regulation and collaboration, while also fostering independence and heightened engagement in learning. These collectively contribute to more successful educational experiences, resulting in improved academic performance across all subjects compared to traditional classrooms. Observing the increasing significance of FCM classes over multiple cycles compared to TCM classes offers valuable insights into learning dynamics. This shift could be attributed to learning adaptation, refined teaching strategies, and a cumulative understanding of FCM concepts. Further qualitative research involving student and tutor feedback could refine teaching strategies and enhance the FCM learning process. Importantly, the study dispels concerns about heightened academic stress. Systematic analysis using established scales revealed that FCM implementations did not impose greater cognitive load or perceived academic stress on students compared to traditional classroom approaches. These findings offer reassuring insights for educators considering adopting FCM in their teaching practices without compromising students' well-being.

Acknowledgements

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The Development of Public Relations Media on Online Platforms
for Organizational Communication of Educational Institution in Thailand, KMUTT

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Abstract

The Faculty of Industrial Education and Technology, King Mongkut's University of Technology Thonburi (KMUTT), Thailand had a mission to communicate and publicize with a variety of target groups, including students, teachers, personnel, parents, enterprises, alumni and other agencies. Therefore, in the digital era it was necessary to rely on technology to play a role and act as an intermediary in communicating the institution content through the economical and fast channel such the online platforms. Therefore, the faculty corporate communication segment had designed and developed public relations media to communicate with 2 target groups: internal groups and external groups with 5 objectives and 8 types of communication channels on online platforms. The research tool used in this study was a satisfaction survey on the faculty public relations media. Using google form collected result from a sample of 20 people with purposive chosen from teachers and students who were the heavy users of the faculty public relations media (every day exposed). The result found that the sample were satisfied with the content aspect at the highest level ($\bar{x}$ = 4.61, S.D.=0.48), with the media presentation aspect at the highest level ($\bar{x}$ = 4.75, SD.= 0.43), and the overall aspect of public relations on online platforms at the highest level ($\bar{x}$ = 4.70, S.D.= 0.46), especially Facebook and Instagram media. Therefore, the designed and developed faculty public relations media could be used to communicate the faculty information with quality.

Keywords: Public Relations Media, Online Platforms, Organizational Communication

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Introduction

In the present day, people are increasingly turning to use online social media instead of traditional media for communication and information sharing. Initially, the use of online social media was often for recreational purposes and communication among acquaintances. Then, it expanded and was applied to businesses for sharing various content to recipients through online networks. This has been widely accepted by people due to its ease of use, rapid access to groups of people, interactive discussions, and diverse types of shared media. The main reasons for the growing popularity of online social media are its user-friendly interface, quick access to groups of people, interactive discussions, and the diverse types of shared media it offers. Additionally, continuous advancements in communication technology and the internet have made it clear that online social media will likely become the primary medium for people in the future. Certainly, educational institutions' public relations work, which targets Generation Z students who primarily use online social media, must be designed, developed, and disseminated with various media types according to the receptivity of the target group.

The Faculty of Industrial Education and Technology at King Mongkut's University of Technology Thonburi (KMUTT) is locate in Bangkok, Thailand. It is an educational institution focused on science and technology and has been established for over 50 years. Therefore, it has a comprehensive public relations system and organizational communication that involves various target groups both internally and externally, such as students, teachers, staff, parents, businesses, alumni, and other organizations within and outside of KMUTT. These target groups collaborate, have mutual interests, and build relationships together. Public relations work is a method or process of disseminating information and news to strengthen relationships and understanding between the organization and its target groups, both internally and externally, to achieve organizational goals and gain widespread recognition, trust, and confidence among students, which impacts the education system and target group satisfaction [1]. This work is relevant to the target groups from the beginning, starting from their status as students before enrolling at the university until they become alumni. Additionally, there is internal and external faculty communication, which involves collaboration among faculty members and the network of communication strategy and marketing teams to ensure accurate, clear, and mutual understanding of the organization's policies and university directions. It also includes understanding the roles and mechanisms of communication in both crisis and normal situations. Furthermore, there are improvements in communication formats adapted to the context and current situations, including content creation, production, information dissemination, and public relations [2].

Apart from that, educational institutions are driven by data, and it is necessary to utilize technology as a central means of communication to connect and communicate through online social media, which is a relatively new form of media. It provides opportunities for people within the organization or faculty to exchange information, enhance collaborative work, and foster a sense of belonging among individuals within the organization. The distinctive feature of social media is that the sender of the information can share content in various formats with the recipients through online networks, enabling interactive communication between the sender and the receivers or among the receivers themselves [3]. Online social media can be categorized into various types commonly used by educational institutions for external communication, such as Facebook Pages, Instagram, and official Line accounts. Additionally, there are internal communication channels that involve bulletin boards, digital signage, Line groups, etc.

With the responsibility of communicating both internally and externally on various platforms, educational institutions aim to maintain high-quality communication with diverse target groups that have different objectives. Sometimes, organizations or faculties with numerous departments face challenges of repetitive or missing communication, leading to gaps in conveying critical information [4]. Therefore, this research seeks to analyze the linkages between media types and target groups through a Communication Matrix of organizational communication and assess the satisfaction of different target groups towards various communication channels. This research serves as a guideline for the continuous development of high-quality public relations media for educational institutions in the future.

Objectives

Faculty of Industrial Education and Technology at KMUTT, an educational organization, five objectives are outlined, which are to inform, create satisfaction, enhance learning, promote development, and foster understand.

1) To Analyze the network of connections between media types and target groups through an Organizational Communication Matrix
2) To assess the satisfaction of the target groups with various public relations media of the educational institution.

Literature Review

The importance of both internal and external communications for the success and sustainability of an organization. Internal communication helps guide, inform, motivate, and provide feedback to officers, ensuring efficient and effective work while meeting the needs of the audience. On the other hand, external communication plays a crucial role in presenting a positive image of the organization to the public and attracting partners and customers. Therefore, organizations should strive to make these communication aspects complementary to each other [5].

The general objectives of public relations are mentioned, including:
1) To create knowledge and understanding among the public about the organization's policies, objectives, activities, and various initiatives through different media channels.
2) To generate popularity among the public, gaining support for the organization's survival and encouraging trust and belief in its policies and activities.
3) To protect and maintain the organization's reputation and build positive relationships with the public, as a good reputation is essential for an organization's survival. Sometimes, an organization may need to sacrifice certain benefits to maintain its reputation because it directly affects how the public perceives the organization.
4) To seek cooperation and support from both internal and external target groups.

Social media has become a valuable tool for public relations professionals, enabling them to leverage its advantages in reaching a wider audience, tracking the success of campaigns, and monitoring potential crises or issues. PR professionals utilize their skills across various social media platforms to achieve their objectives effectively [6]. In Thailand, social media usage is widespread, with approximately 52.25 million users, accounting for 72.8% of the population,

particularly among the age group of 18 years and above, with a high usage rate of 84.8%. Thai people spend an average of 2 hours and 44 minutes per day on social media. The usage ratio between males and females is relatively close. The most popular social media platforms among Thais, ranked from the most to the least used, are Facebook (91%), LINE (90.7%), Facebook Messenger (80.8%), TikTok (78.2%), Instagram (66.4%), and Twitter (51.2%) [7].

As for the Faculty of Industrial Education and Technology at KMUTT, being an educational organization, it communicates with both internal and external target groups, requiring a multi-platform communication approach. The communication platforms used include bulletin boards, print media, website, Facebook/Instagram, Line groups, digital signage, Line Open chat, and Line OA.

Methodology

In the analysis of the linkage between media types and target groups through the Communication Matrix of the educational institution, the researchers focused on two target groups: internal groups and external groups. There were five main objectives and eight types of communication channels involved (2023).

To conduct the study, the researchers utilized a Google Form survey to evaluate the satisfaction of the target groups, who were heavy users, towards various public relations media used by the educational institution. The survey included 20 participants and was conducted in May 2023.

As part of the study, the research team developed and implemented examples of public relations media on various platforms.

Examples of public relations media developed and implemented by the research team on various platforms.
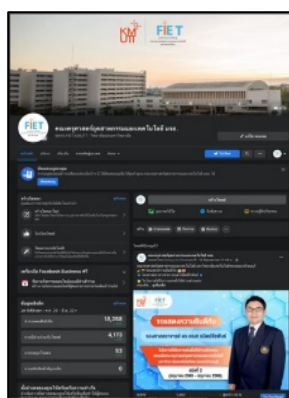
Figure 1: Faculty Facebook

Figure 2: Faculty Instagram
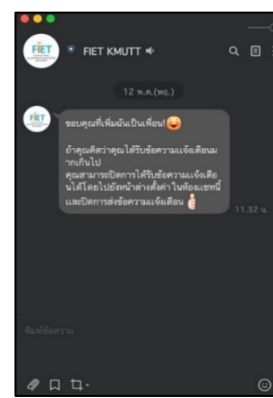
Figure 3: Faculty Line OA

Figure 4: Faculty Digital signage
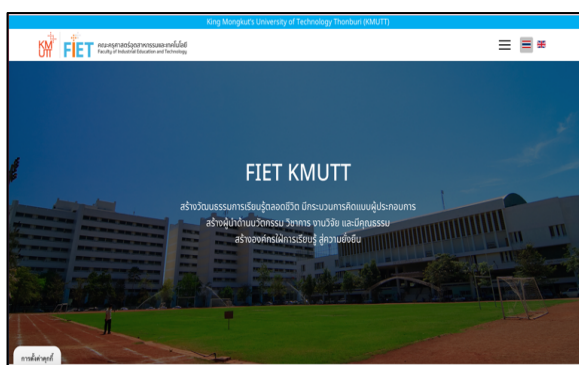
Figure 5: Faculty Website

Results

Analysis of the Linkage Matrix Between Media Types and Target Groups Through the Organizational Communication Matrix

Table 1. The analysis of the linkage matrix

Communication (X) / Target (Y)	Target		Objectives					Channels							
	Internal	External	Informing	Creating satisfaction	Enhancing learning	Promoting development	Fostering understanding	Bulletin boards	Print media	Web site	FB / IG	Line Group	DS	Line Open chat	Line OA
Students in Schools		✔	●	X	●	X	●	X	X	●	●	X	X	X	●
Students in KMUTT	✔		●	●	●	●	●	●	●	●	●	●	●	●	●
Professors	✔	✔	●	○	●	○	●	●	●	●	●	●	●	○	○
Staff	✔		●	○	●	○	●	●	●	●	●	●	●	●	○
Parents		✔	○	○	○	○	●	X	○	●	○	○	○	X	○
Businesses/ Colleges		✔	●	○	○	○	●	X	○	●	○	○	X	X	X
Alumni		✔	●	○	●	●	●	X	○	●	●	X	X	○	X
Other units/ organizations with in KMUTT		✔	●	○	○	○	●	●	●	●	●	X	X	●	○
International organizations/ agencies		✔	●	X	●	X	●	X	X	X	●	X	X	X	X

○ Indirect communication channels used

● Direct communication channels used

X Not related to each other

From the analysis of the linkage matrix, two target groups were identified: internal groups and external groups, with five objectives and eight types of communication channels. The student group, which is an internal target group, was found to be able to perceive all 5 communication objectives and utilize all 8 types of communication channels effectively. Following that, the staff group, which is an external target group, was found to perceive only one communication objective, which is to create understanding, and they use the fewest communication channels, with only the organization's website being utilized.

Results of the Satisfaction Assessment of the Target Groups Towards Various Public Relations of the Educational Institution

Table 2. The results of the satisfaction assessment of the sample group

Title for evaluation	Results		
	$\bar{x}$	S.D.	Level of Satisfaction
1. Content aspect	4.61	0.48	The Highest
2. Media presentation aspect	4.75	0.43	The Highest
3. Overall aspect of public relations on online platforms	4.70	0.46	The Highest
Overall Average Evaluation Result	**4.68**	**0.45**	**The Highest**

The research findings indicate that the sample group has the highest level of satisfaction in terms of content ($\bar{x}$ = 4.61, S.D. = 0.48). This is due to the clarity, accuracy, reliability, and up-to-dateness of the information provided, as well as the use of appropriate language. Regarding presentation, the sample group expressed the highest level of satisfaction ($\bar{x}$ = 4.75, S.D. = 0.43) as the design was aesthetically pleasing and suitable for all communication channels and media that represent the Faculty of Industrial Education and Technology, KMUTT. Regarding the overall online media, the sample group reported the highest level of satisfaction ($\bar{x}$ = 4.70, S.D. = 0.46). Notably, the sample group ranked the online media types used by the organization in descending order of preference: Facebook, Instagram, and LINE Open Chat.

Discussion

The analysis of the linkage matrix between media types and target groups through the organizational communication matrix reveals that the student group, as an internal target group, can comprehend all 5 objectives of public relations and utilizes all 8 types of communication channels comprehensively. These findings align with the research conducted by Namaso, K.et al, 2022 [8] the research findings reveal that the sample group, consisting of 30 third-year undergraduate students from the Department of Education Communications and Technology, Faculty of Industrial Education and Technology, KMUTT in the first semester of the academic year 2021, has the highest level of satisfaction in the interactive multimedia and activities for new normal public relations aimed at promoting the public image of the Continuing Education Center ($\bar{x}$ = 4.68, S.D. = 0.48). This is in line with the concept of perception as defined by Saksri, K. [9], which emphasizes the use of various media formats to enhance perception.

Furthermore, the research also found that the sample group has the highest level of satisfaction in the content aspect, media presentation aspect, and overall aspect of public relations on online platforms, overall average evaluation result was at the highest level ($\bar{x}$ =

4.68, S.D.= 0.45). The organization employed infographics to facilitate easy and rapid understanding, which aligns with Rider, Z.'s work in 2013 [10], suggesting that compressing information into visual graphics makes it easier for people to comprehend compared to reading. The use of attractive graphics allows people to access and understand large amounts of information through a single image.

Additionally, the research aligns with the findings of Princhankol, P., et al., 2023 [11], who designed and developed infographic video clips on various online social media platforms of the Faculty of Industrial Education and Technology, KMUTT, including Facebook, Instagram, and TikTok, along with live contents on Facebook Fanpage. The research found that the perception and satisfaction of the sample group regarding the media development and special hybrid event during the Covid-19 pandemic were at the highest level ($\bar{x}$ = 4.79, S.D. = 0.45), ($\bar{x}$ = 4.76, S.D. = 0.45). The item with the highest mean score was "The technique in the presentation of media and activities" ($\bar{x}$ = 4.85, S.D. = 0.45).

Conclusion

The analysis of the linkages between media types and target groups through the Matrix of organizational communication revealed that the group of students, who are the internal target group, can perceive all five objectives of public relations and utilize all eight types of communication channels comprehensively. This indicates that Gen Z has the highest level of perception when it comes to online platforms compared to other target groups.

Furthermore, the research findings also showed that the sample group has the highest level of satisfaction in the overall aspect of online media, with the organization's online media types such as Facebook and Instagram being the most widely used. This highlights the power of online communication tools for the sample group. As designers and developers, consideration should be given to both content and media presentation aspects simultaneously.

Suggestion

1) The organizational communication department should review the matrix of linkages between media types and target groups by intensifying the connections with the parents' group, which has the lowest level of linkage. Following that, the next target group to focus on is the business/college, both of which are considered external target groups, and are of high importance in promoting the educational institution.

2)When designing content and presentation formats for various online platforms, it essential to consider them together. The advantages of online platforms lie in their convenience and speed of production and dissemination. However, PR practitioners should exercise caution in content design, such as selecting images that represent the organization's identity, university, and Thai culture, which has intricate details and hierarchical practices before dissemination. This filtering process should also apply to offline media, including printed materials and bulletin boards.

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Unveiling Parental Perspectives: Determinants of Behavioural Intentions and Usage Behaviours in Ubiquitous Learning During Crises

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Abstract
This study aims to investigate the determinants shaping the behavioural intentions and usage patterns of primary school parents within a private school in Samutprakarn, Thailand, specifically in the context of ubiquitous learning (u-learning). Employing a quantitative research design, the study engaged 500 respondents through an online questionnaire, utilising a non-probability sampling technique. Prior to administration, content validity and reliability of the questionnaire were ensured through Item-Objective Congruence and pilot testing. The data underwent analysis via Confirmatory Factor Analysis (CFA) and Structural Equation Modelling (SEM). The results reveal that perceived usefulness significantly influences both attitude and behavioural intention towards u-learning, while effort expectancy directly impacts the intention to embrace technology. Furthermore, behavioural intention emerges as a direct precursor to the actual use behaviour in the context of ubiquitous learning. In contrast, perceived ease of use, performance expectancy, social influence, and attitude were identified as non-significant factors. In conclusion, the study underscores the pivotal role of perceived usefulness, followed by effort expectancy, in shaping the acceptance of technology. This highlights the imperative for technology developers, curriculum designers, and educators to strategically incorporate these elements into the design of effective u-learning systems tailored for primary school learners, particularly during crises.

Keywords: Ubiquitous Learning, TAM, UTAUT2, Primary School Parents, COVID-19

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Introduction

The onset of the COVID-19 pandemic brought about a seismic shift in the dynamics of education, compelling parents of school-age children to assume an active role in home-based learning while concurrently managing their daily work responsibilities. As schools transitioned to remote teaching, parents found themselves grappling with concerns over the quality of education, the well-being of their children, and the repercussions of remote learning on family life.

Some parents perceived online learning as less effective than traditional on-site learning, leading to potential repercussions on their children's academic progress (Huang et al., 2017).

In response to the challenges posed by school closures, education officials, school administrators, and teachers explored diverse modes of learning, including digital platforms, TV/radio broadcasts, and traditional paper-based methods, to mitigate the learning gap. Ubiquitous learning (u-learning), as described by Cope and Kalantzis (2013), encompasses traditional classroom elements but distinguishes itself by allowing students to study anywhere and anytime using technology. Haythornthwaite (2019) outlines key features of u-learning, emphasising flexibility in learning location, time, process, output, and the involvement of key individuals managing knowledge flow.

Technology plays a crucial role in u-learning, demanding learners' attention and fostering authentic, instinctive, and unconstrained knowledge acquisition (Li et al., 2005). Various platforms, such as Google Meet, Microsoft Teams, Zoom, and others, enable simultaneous participation, while asynchronous learning is facilitated through Learning Management Systems (LMS) like Google Classroom, Moodle, and others, accommodating different time zones and schedules (Ironsi, 2021; Serdyukov, 2021).

Despite the potential for successful learning experiences, the study recognises the need to consider available resources, including teacher expertise, infrastructure, technology access, and parental support. Concerns raised by parents and guardians in the study locale highlight challenges related to prolonged screen time, limited technical skills, and a lack of understanding of digital learning systems.

As the pandemic persisted, parents faced the inevitability of incorporating technology into their children's education, prompting requests for technical assistance and training on u-learning. The study focuses on the specific use of Google Meet and Google Classroom, where a regular timetable was established, and parents were given the option to choose between live sessions and recorded content for more flexible learning.

The research aims to delve deeper into the behaviour intention and use behaviour of primary school parents as they navigate the role of technology in bridging the gap between teachers and learners during the global health crisis. The study zeros in on the perceptions of parents with practical experience in using u-learning while assisting their children in the context of the pandemic. The results aim to contribute new insights to the intersection of Technology, Education, and Management, particularly in the context of primary school during crises.

Research Objectives

1. To examine the significant relationship between perceived usefulness and attitude.
2. To analyse the significant relationship between perceived usefulness and behavioural intention.
3. To explore the significant relationship between perceived ease of use and behavioural intention.
4. To discover the significant relationship between performance expectancy and behavioural intention.
5. To inspect the significant relationship between effort expectancy and behavioural intention.
6. To assess the significant relationship between social influence and behavioural intention.
7. To find the significant relationship between attitude and behavioural intention.
8. To scrutinise the significant relationship between behavioural intention and use behaviour.

Research Questions

1. What is the significant relationship of perceived usefulness towards attitude?
2. What is the significant relationship of perceived usefulness toward behavioural intention?
3. What is the significant relationship of perceived ease of use towards behavioural intention?
4. What is the significant relationship of performance expectancy towards behavioural intention?
5. What is the significant relationship of effort expectancy towards behavioural intention?
6. What is the significant relationship of social influence towards behavioural intention?
7. What is the significant relationship of attitude towards behavioural intention?
8. What is the significant relationship of behavioural intention towards use behaviour?

Research Framework

The current research articulates a refined conceptual framework, synthesising fundamental tenets from the Technology Acceptance Model (TAM) and the extended Unified Theory of Acceptance and Use of Technology (UTAUT2) Model. TAM, as elucidated by Davis (1989), provides a lens through which to understand the adoption and utilisation of technology. Core constructs such as perceived usefulness, perceived ease of use, intention, belief, and attitude delineate the trajectory towards technology use. Notably, TAM has demonstrated that perceived usefulness and perceived ease of use, as independent variables, wield a direct influence on behaviour intention and use behaviour—the dependent variables.

In contrast, UTAUT2, posited by Venkatesh et al. (2012), elucidates factors influencing consumer acceptance and use of technology in diverse contexts. Embracing seven key constructs—performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, and habit—UTAUT2 has found application in examining technology acceptance across various domains, including mobile learning, e-commerce, and e-health.

To fortify the foundations of the research model, the study draws upon seven theoretical frameworks. The first is derived from Jaiyeoba and Iloanya's (2019) exploration of perceived usefulness, perceived web-based privacy, e-learning use, perceived ease of use, attitude, and

learners' behavioural intentions in predicting technology adoption for e-learning. The second, grounded in Arteaga-Sanchez et al.'s (2013) investigation, explores the impact of technical support, computer self-efficacy, perceived usefulness, ease of use, attitude, and system usage on the adoption of the WebCT system. The third, based on Hu and Zhang's (2016) study, delves into the behavioural intentions of tertiary learners regarding mobile library (m-library), considering constructs like perceived usefulness, service quality, attitude, self-efficacy, system quality, information quality, subjective norm, and behaviour intention.

The fourth framework, from Gunasinghe et al. (2020), investigates the adoption of e-learning in higher education, incorporating nine constructs—performance expectancy, effort expectancy, social influence, hedonic motivation, habit, facilitating conditions, personal innovativeness in IT, behavioural intention to use e-learning, and e-learning adoption behaviour. The fifth framework, drawing on Sitar-Taut and Mican's (2021) research on mobile learning acceptance during social distancing, utilizes the Social Distancing- Unified Theory of Acceptance and Use of Technology (SD-UTAUT2) extended model to explore relations between original constructs and personal innovativeness, information quality, hedonic motivation, and learning value.

The sixth framework, inspired by Paola Torres Maldonado et al.'s (2011) study, probes into e-learning motivation, social influence, facilitating conditions, gender, region, behaviour intention, and use behaviour. The seventh, rooted in McKeown and Anderson's (2016) investigation of an online learning platform, employs the UTAUT framework to scrutinise factors influencing the behaviour intention and use behaviour of undergraduate and postgraduate students.

Synthesising these theoretical frameworks, Figure 1 presents the current conceptual framework, offering a comprehensive depiction of the interplay among various constructs in understanding the behaviour intention and use behaviour of individuals in the context of technology adoption during a global health crisis.
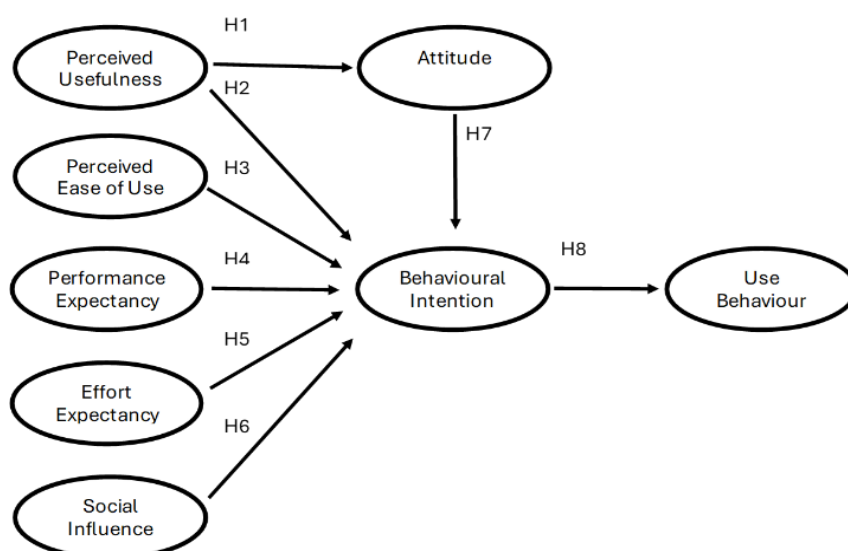
Figure 1: Research Conceptual Framework

Research Hypotheses

Based on the conceptual framework, the following hypotheses were developed.

H1: There is a significant influence between perceived usefulness and attitude.
H2: There is a significant influence between perceived usefulness and behavioural intention.
H3: There is a significant influence between perceived ease of use and behavioural intention.
H4: There is a significant influence between performance expectancy and behavioural intention.
H5: There is a significant influence between effort expectancy and behavioural intention.
H6: There is a significant influence between social influence and behavioural intention.
H7: There is a significant influence between attitude and behavioural intention.
H8: There is a significant influence between behavioural intention and use behaviour.

Research Design

This research employed a quantitative approach, utilising online survey questionnaires administered through the Google survey form platform. A set of 40 scale items, drawn from prior studies investigating technology use in learning, was meticulously crafted and subjected to rigorous evaluation through the Item-Objective Congruence (IOC) test and Cronbach's Alpha test to ensure both relevance and internal consistency. Following the successful completion of reliability testing, the online survey was distributed to a cohort of 500 primary school parents within a private school setting, each having a minimum exposure of one academic term, equivalent to approximately four months, to ubiquitous learning (u-learning).

The analysis of the gathered data involved a two-step process. Firstly, Structural Equation Modelling (SEM) was employed, utilising SPSS and AMOS for Confirmatory Factor Analysis (CFA) to establish convergent validity. Subsequently, SEM was conducted to unveil the causal relationships among all constructs outlined in the conceptual model, scrutinising the significant influences and testing the proposed hypotheses. The application of SEM offers a robust analytical framework, allowing for a comprehensive exploration of the factors shaping technology acceptance and use. This approach not only enhances our understanding of the Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT2) but also provides valuable insights into the intricate dynamics influencing these frameworks (Hair et al., 2010).

Results and Discussions

Confirmatory Factor Analysis

The application of Confirmatory Factor Analysis (CFA) stands as a crucial methodological tool within the realm of social and behavioural sciences, playing a pivotal role in bridging the gap between theoretical constructs and observed phenomena (Mueller & Hancock, 2001). In ensuring the comprehensive validation of our model, the researcher conducted assessments of model fit, convergent validity, and discriminant validity.

The outcomes of the CFA unveil the significance of all items within each construct, exhibiting factor loadings that adhere to discriminant validity criteria. Following Stevens' (1992) guidelines, items are considered satisfactory when their loadings exceed 0.40 with a p-value below 0.05.

To further substantiate the reliability of the model, Composite Reliability (CR) was evaluated against the established threshold of 0.70, as suggested by Fornell and Larcker (1981). The current study attains satisfactory CR values ranging from 0.712 to 0.856, as illustrated in Table 1.

Despite the Average Variance Extracted (AVE) values ranging from 0.369 to 0.576, falling slightly below the recommended threshold of 0.4, the study maintains convergent validity as the Composite Reliability (CR) surpasses 0.6 for all constructs, underscoring the reliability of the instrument.

Cronbach's Alpha, a widely accepted measure of internal consistency reliability, was employed to further validate the instrument's reliability, aligning with established practices in educational research (Tavakol & Dennick, 2011). The reporting of high Cronbach's Alpha values, consistently above 0.7, not only ensures reliability within the current study but also facilitates cross-study comparisons of instrument reliability in the broader field of u-learning research (Nunnally & Bernstein, 1994). As evidenced in Table 1, the reliability analysis values for all constructs in this study range from 0.705 to 0.856, affirming the overall reliability of the instrument.

Variables	Source of Questionnaire (Measurement Indicator)	No. of Items	Cronbach's Alpha	Factor Loading	CR	AVE
Perceived Usefulness (PU)	Arteaga-Sanchez et. al. (2013)	6	0.793	0.524 – 0.725	0.792	0.391
Perceived Ease of Use (PEOU)	Park et. al. (2015)	7	0.823	0.472 – 0.772	0.800	0.369
Performance Expectancy (PE)	Talukder et. al. (2019)	4	0.803	0.490 – 0.874	0.786	0.495
Effort Expectancy (EE)	Hew et. al. (2015)	5	0.856	0.656 – 0.807	0.856	0.544
Social Influence (SI)	Sobti (2019)	4	0.828	0.582 – 0.937	0.839	0.576
Attitude (A)	Fatima et. al. (2017)	4	0.705	0.545 – 0.665	0.712	0.383
Behavioural Intention (BI)	Lin (2013)	5	0.739	0.510 – 0.693	0.747	0.374
Use Behaviour (UB)	Sitar-Taut and Mican (2021)	5	0.815	0.534 – 0.862	0.820	0.486

Note: CR = Composite Reliability, AVE = Average Variance Extracted

Table 1: Confirmatory Factor Analysis Result

To confirm discriminant validity and ensure the precise encapsulation of constructs, the square root of each Average Variance Extracted (AVE) was meticulously computed, aligning with established procedures outlined by Fornell and Larcker (1981) and Stevens (1992).

Inspection of Table 2 reveals that the AVE square roots of the variables, listed diagonally, surpass all inter-construct and factor correlations, further affirming the discriminant validity of the measurement tool.

In addition to discriminant validity assessments, several indices were employed to gauge the measurement model's goodness of fit. These indices, including CMIN/DF, GFI, AGFI, NFI, CFI, TLI, IFI, and RMSEA, collectively underscore the alignment between the statistical values and empirical data, attesting to the model's overall goodness of fit. This comprehensive evaluation reinforces the reliability of the measurement model and its apt representation of the underlying constructs.

Variables	EE	PU	PEOU	PE	SI	UB	BI	A
EE	**0.737**							
PU	0.064	**0.625**						
PEOU	-0.035	0.177	**0.608**					
PE	-0.028	0.439	0.318	**0.704**				
SI	0.003	0.177	0.205	0.154	**0.759**			
UB	0.039	0.248	0.106	0.275	0.122	**0.697**		
BI	0.171	0.253	0.139	0.224	0.101	0.223	**0.611**	
A	-0.031	0.319	0.144	0.276	0.223	0.136	0.136	**0.619**

Note: The diagonally listed value is the AVE square roots of the variables

Table 2: Discriminant Validity

Structural Equation Model (SEM)

The current study employed Structural Equation Modelling (SEM) as the analytical framework for scrutinising the amassed data, offering valuable insights into the intricate factors influencing technology acceptance and use, thereby enriching our comprehension of established models (Hair et al., 2010). SEM's unique capability to simultaneously estimate multiple relationships (Kline, 2015) and account for measurement errors in the estimation of relationships among constructs from Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT2) contributes to the robustness of the analysis (Hair et al., 2010).

Beyond its simultaneous estimation prowess, SEM facilitates the comparison of competing models and the assessment of overall model fit to the data (Hu & Bentler, 1999). Moreover, SEM allows for the exploration of mediation and moderation effects, offering a rigorous statistical approach to testing and validating the theoretical model (Hair et al., 2010; Kline, 2015).

The goodness of fit for the structural model is meticulously evaluated and presented in Table 3, with the following results: CMIN/DF= 1.355, GFI= 0.915, AGFI= 0.901, NFI= 0.874, CFI= 0.963, TLI= 0.960, IFI= 0.964, and RMSEA= 0.027. These results illustrate values well within the acceptable range for each index, affirming the structural model's appropriateness for elucidating the relationships among the constructs and providing a sound basis for drawing meaningful conclusions.

Index	Acceptable Values	CFA Value	SEM Value
CMIN/DF	< 3.00 (Hair et al., 2006)	1.333	1.355
GFI	≥ 0.90 (Hair et al., 2006)	0.918	0.915
AGFI	≥ 0.90 (Hair et al., 2006)	0.904	0.901
NFI	≥ 0.85 (Kline, 2011)	0.878	0.874
CFI	≥ 0.85 (Kline, 2011)	0.966	0.963
TLI	≥ 0.85 (Kline, 2011)	0.962	0.960
IFI	≥ 0.85 (Kline, 2011)	0.967	0.964
RMSEA	≤ 0.05 (Browne & Cudeck, 1993)	0.026	0.027

Note: CMIN/DF = The ratio of the chi-square value to degree of freedom, GFI = goodness-of-fit index, AGFI = adjusted goodness-of-fit index, NFI = normalised fit index, CFI = comparative fit index, TLI = Tucker-Lewis index, IFI = Incremental Fit Index, and RMSEA = root mean square error of approximation

Table 3: Goodness of Fit

Research Hypotheses Testing Result

The results of the hypotheses testing for the structural model among primary school parents yield nuanced insights into the factors influencing their acceptance and utilisation of ubiquitous learning (u-learning) during the global health crisis.

H1 establishes a significant influence between perceived usefulness and attitude for primary school parents with an optimistic outlook on technology use in lieu of traditional face-to-face lessons. Their belief in the efficacy of u-learning during the pandemic, aligned with previous studies (Chen & Wu, 2020; Huang et al., 2014), underscores the positive impact of perceived usefulness on fostering favourable attitudes.

H2 confirms that parents' belief in u-learning's potential to enhance their children's academic performance significantly influences their intention to accept it during the health crisis. This relationship, consistent with prior technology acceptance studies (Davis, 1989; Wang & Chen, 2020), emphasises the pivotal role of perceived usefulness in shaping behavioural intentions amid challenging circumstances.

Contrary to expectations, **H3** negates the assumed significant influence between perceived ease of use and behavioural intention among primary school parents. The findings suggest that parents prioritise factors beyond their comfort level when considering u-learning, aligning with studies that highlight diverse considerations in technology adoption (Alzaza & Yaakub, 2018; Kim & Park, 2018).

H4 challenges the assumption that any technology promising improved learning performance would automatically gain support from primary school parents. The results diverge from expectations, echoing similar findings in related literature (Liu, 2015; Ma & Li, 2011), highlighting the need for nuanced considerations beyond performance promises.

In contrast, **H5** upholds the validity of the relationship between effort expectancy and behavioural intention. Parents perceive u-learning as easy and effortless to use, influencing their decision to accept and integrate the system during the pandemic. This aligns with findings in existing literature (Liu et al., 2021; Ma & Li, 2011) emphasising the importance of user-friendly interfaces.

H6, however, fails to gain traction as primary school parents do not consider external opinions and social influence in their intent to allow their children to use u-learning during the crisis. Similar results in other studies (Kim & Park, 2018; Song & Lee, 2020) indicate the insignificance of social influence in this context.

H7 highlights a lack of relationship between attitude and behavioural intention, suggesting that positive feelings may not necessarily drive parents' decisions to allow their children to participate in u-learning. This echoes similar findings in related studies involving primary and university students (Abaido & Al-Rahmi, 2021; Iqbal & Qureshi).

Lastly, **H8** provides evidence of the effect of higher intention on the actual use of technology among primary school parents. Those with a strong purpose and plan to use u-learning exhibit full participation in the system, aligning with conclusions drawn from studies among the same age group or older learners (Hwang et al., 2021; Baturay & Bayir, 2019). These findings collectively offer a comprehensive understanding of the complex dynamics influencing technology acceptance and utilisation in the context of primary school education during a global health crisis.

Summary of the Hypotheses Testing Result

Table 4 presents the statistical significance of each variable, elucidated through its standardised path coefficient (ß) and corresponding t-value. The relationships between the constructs are visually represented in Figure 2, where a p-value of <0.05 is essential to substantiate each hypothesis. In the graphical depiction, a solid line denotes support for the hypothesis, while a dashed line signifies a lack of validation for the proposed premise.

Hypothesis	Standardised path coefficient (β)	t-value	Testing result
H1: PU → A	0.367	5.426*	Supported
H2: PU → BI	0.178	2.371*	Supported
H3: PEOU → BI	0.068	1.113	Not Supported
H4: PE → BI	0.130	1.935	Not Supported
H5: EE → BI	0.166	2.988*	Supported
H6: SI → BI	0.032	0.587	Not Supported
H7: A → BI	0.033	0.507	Not Supported
H8: BI → UB	0.245	3.858*	Supported

Note: *Significant at p-value, $p < 0.05$

Table 4: Hypotheses Testing Result of the Structural Model
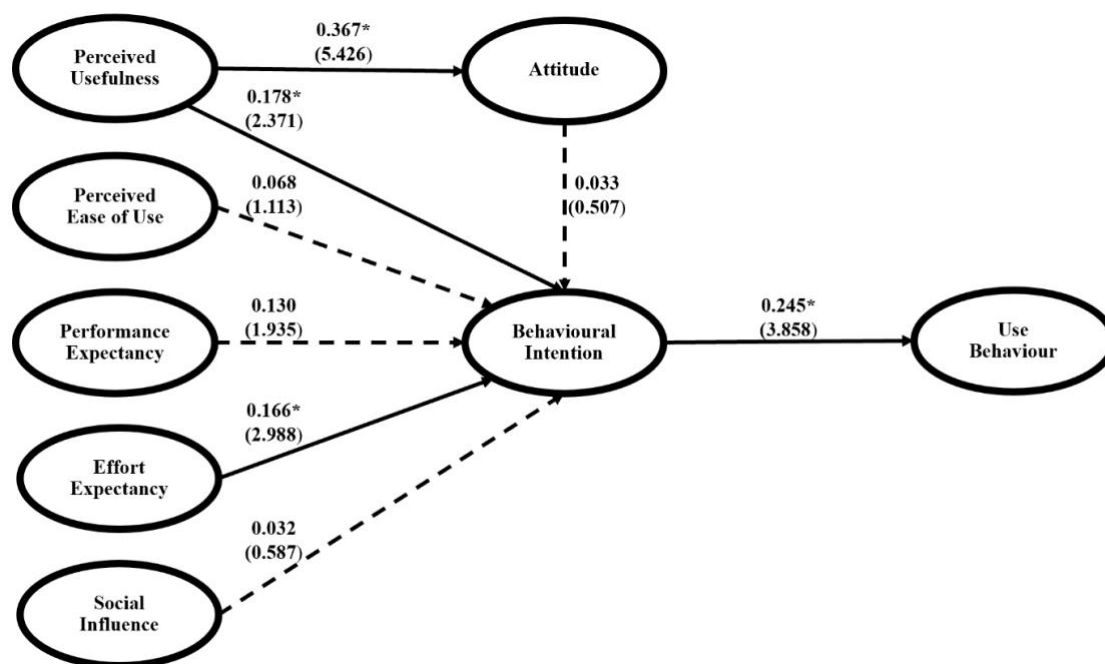
Note: Solid line reported the Standardised Coefficient with * as p<0.05, and t-value in Parentheses; Dash line reports Not Significant

Figure 2: The Result of Structural Model

Conclusion

In accordance with the study's findings, significant relationships emerged between perceived usefulness and attitude, perceived usefulness and behavioural intention, effort expectancy and behavioural intention, as well as behavioural intention and use behaviour. These observed associations align with established frameworks such as TAM and UTAUT2.

Existing research consistently emphasises a positive relationship between perceived usefulness and attitude, where users perceiving a technology as useful develop a favourable attitude, enhancing the likelihood of technology adoption and usage (Davis, 1989; Venkatesh & Davis, 2000). Furthermore, literature on technology adoption consistently supports perceived usefulness as a significant predictor of both behavioural intention and use behaviour in the context of u-learning (Al-Fraihat et al., 2020; Hung et al., 2014). This underlines the pivotal role of users' perception that u-learning aligns with their learning goals and enhances academic performance.

Additionally, the study affirms the critical predictive role of effort expectancy in behavioural intention and use behaviour, suggesting that users are more inclined to adopt and use u-learning when it is perceived as easy and requires minimal effort (Al-Fraihat et al., 2020; Lee et al., 2020). These findings confirm that factors highlighted in TAM and UTAUT2, specifically perceived usefulness and effort expectancy, significantly influence behavioural intention and use behaviour. Consequently, designers and educators should prioritise the development and promotion of u-learning technologies perceived as useful, user-friendly, and positively evaluated by users.

On the contrary, the study delves into the implications for TAM and UTAUT2 theories arising from the insignificant influences between perceived ease of use and behavioural intention, performance expectancy and behavioural intention, social influence and

behavioural intention, and attitude toward behavioural intention. Discrepant findings across various studies indicate the complex nature of these relationships in the context of u-learning adoption. Some studies negate the relevance of perceived ease of use, performance expectancy, and social influence in u-learning adoption (Al-Fraihat et al., 2020; Hung et al., 2014), while others identify their significance (Lee et al., 2020; Kim and Park, 2018).

While attitude traditionally holds a strong association with technology adoption, instances exist where it does not significantly impact behavioural intention, as evidenced by Kim and Kankanhalli's (2009) study on web-based learning. This underscores the intricate nature of the attitude-behavioural intention relationship, dependent on various factors such as technology specificity, user characteristics, and contextual considerations. Users may harbour positive attitudes but refrain from using a technology due to factors like cost, time constraints, or social norms.

In summary, despite the importance of perceived ease of use, performance expectancy, social influence, and attitude in TAM and UTAUT2, the study emphasises the need for further research specific to the primary school context during a crisis. Gaining a comprehensive understanding of the factors influencing the adoption and use of u-learning necessitates exploration beyond traditional constructs, considering the unique challenges and dynamics present in this specific educational setting.

Implications

The outcomes of this study offer valuable insights into enhancing technology acceptance and usage, particularly among primary school parents during the COVID-19 pandemic or any natural or unnatural crises. In recognizing the factors with either weak or no influence on the adoption and use of u-learning, the following recommendations are proposed.

Firstly, given the insignificance of perceived ease of use, designers should prioritise simplifying the user interface through streamlined navigation and clear language, complemented by online tutorials and helpdesk support.

Secondly, as performance expectancy was found to have no influence, it is essential to enhance the perceived value by ensuring learning content is relevant, up-to-date, and engaging, incorporating gamification elements for a more enjoyable learning experience.

Thirdly, addressing the lack of impact of social influence involves promoting collaborative and social learning, encouraging peer feedback and integrating social media tools for enhanced connectivity.

Lastly, the insignificance of attitude calls for emphasising the benefits of u-learning, highlighting its convenience, flexibility, cost-effectiveness, and potential for personalised learning, alongside user support mechanisms such as tutorials and online help desks. By comprehensively addressing these aspects, educators and researchers can develop effective strategies to promote the adoption and use of u-learning platforms, catering to the specific needs of primary school learners in the context of the pandemic.

Limitations

It has to be noted that this study delves mainly into the determinants influencing the behaviour intention and use behaviour of u-learning among primary school parents in a private school in Samutprakarn, Thailand. To enhance the comprehensiveness and applicability of the research, a suggestion is made to augment the research methodology beyond the current quantitative approach. Integrating a qualitative dimension, such as Key Informant Interviews (KIIs) involving parents, educators, and students, can bring depth to the investigation and mitigate potential limitations. Additionally, conducting Focus Group Discussions (FGDs) with parents from both pre-school and primary school levels can yield a richer analysis of responses, allowing for a nuanced understanding of the phenomena. This mixed-methods approach would prove valuable in identifying any disparities between quantitative and qualitative findings.

Furthermore, in advancing the study's breadth, future research could incorporate a diverse array of participants, encompassing teachers, students, administrators, and technology designers. Expanding the study to include various school types, both government and private, in urban and rural areas would contribute to a more comprehensive exploration. Moreover, involving participants from different economic backgrounds would offer insights into the varying degrees of acceptance and utilisation of u-learning, considering potential discrepancies in technology access.

Finally, a prospective study could investigate the inclusivity of the u-learning system, specifically examining how learners with physical impairments and learning difficulties engage with and respond to u-learning. This examination could yield valuable insights guiding platform refinement, content adaptation, or system adjustments tailored to the diverse needs of these learners. Such enhancements would contribute to the overall effectiveness and accessibility of u-learning in diverse educational settings.

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Development of a Java Source Code Analyzer for Learning Support That Runs in a Web Browser

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Abstract

Students make various mistakes in the process of practicing computer programming. For this reason, we have developed a source code analyzer, which evaluates the source code submitted by students from The tool can identify misspellings in the method names of source code and can judge the compiling and execution results. However, because the tool was developed to run on a teacher's PC, it does not easily fit into the format of general programming learning sites. The use of a programming learning site is advantageous in that it allows students to learn programming without having to build a programming environment. However, programming languages other than those that run in the client browser, such as JavaScript, must be compiled and evaluated on the server side, placing a heavy burden on the server side. Therefore, we decided to use a method of running the developed tools on the As a result, we confirmed that the basic functionality of the tool runs on the browser and outputs evaluation results. The basic functionality of the tool outputs the results of spelling errors in class names and method names, coding style, compilation results, and execution. The basic functionality of the tool outputs the results of spelling errors in class names and method names, coding style, compilation results, and execution results for source code written in Java.

Keywords: Programming Education, Source Code Analyze, Learning Support Tools

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Introduction

In today's society, the role of ICT (Information and Communication Technology) is becoming more important as AI (Artificial Intelligence) is becoming an everyday part of our daily lives. Therefore, software development technology is one of the important elements for constructing information systems, and the importance of training programming engineers is increasing. In Japan, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) is promoting education that incorporates programming in compulsory education (Ministry of Education, Culture, Sports, Science and Technology. 2021).

And in introductory programming education, knowing the learning elements necessary for beginning students to master programming is an important guideline for improving the effectiveness of education. It is also important to know the elements that cause stumbling blocks in learning programming, and learning programming requires practice that includes the experience of making mistakes (Martin, R.C., 2008).

Therefore, we have developed a source code analyzer that can perform unit testing from an educational perspective, considering spelling errors. This tool analyzes source code created by learners using both static analysis methods that evaluate coding styles and program definitions, and dynamic analysis methods that evaluate by executing unit tests. This tool was previously used as a core function of our system (Shin Hasegawa, et al. 2011) to evaluate learners' source code in real time during lectures. Currently, this tool is also used to evaluate programming assignments (Takano, T. et al. 2023).

A related study is AutoLEP (W. Tiantian, et al. 2009), a system for evaluating learners' source code. This system evaluates programs statically and dynamically and feeds back errors to students. The difference between this tool and AutoLEP is that AutoLEP evaluates program errors based on similarity to the correct program, whereas AutoLEP allows misspellings in definitions and dynamically evaluates the implementation through unit tests. However, since the tool was developed to run on a teacher's PC, it does not easily fit into the format of general programming learning sites. The use of a programming learning site is advantageous in that it allows students to learn programming without having to build a programming environment. However, programming languages other than those that run in the client browser, such as JavaScript, must be compiled and evaluated on the server side, placing a heavy burden on the server side of the programming learning site.

We decided to use Doppio (Vilk, John. at el. 2014), a Java Virtual Machine that runs as JavaScript in the browser, to run the developed tools on the client side.

Development Tool Overview

The Source Code Analyzer is intended for Java programs that create source code from new files. The tool is developed in Java and Apache Groovy (Figure 1).
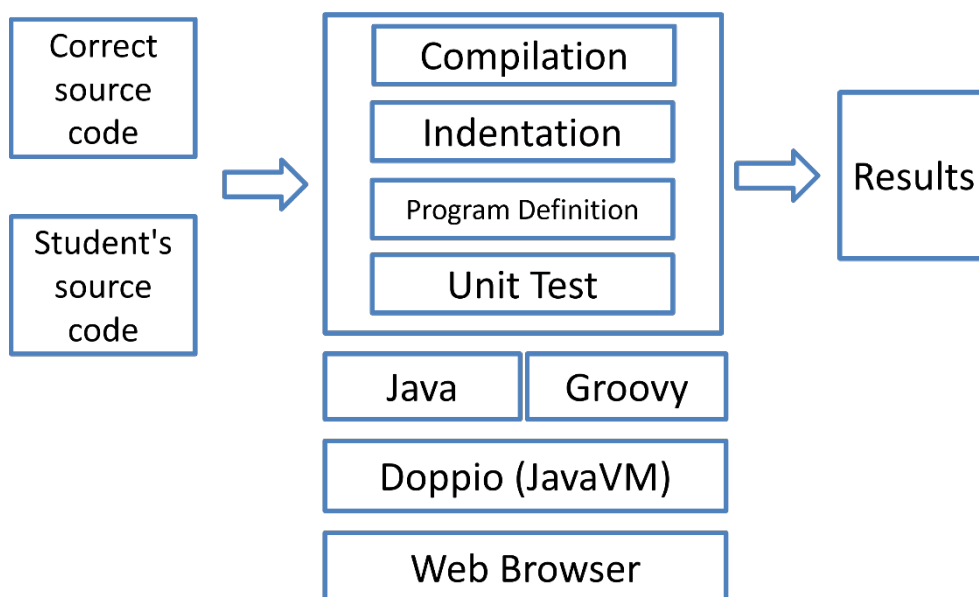
Figure 1: Overview of source code analyzer

The tool makes judgments on the main items: compilation, indentation, program definition, and unit testing. The tool also determines misspellings at various points before the learner completes the program. The following is a list of the main areas where spelling errors are detected.

- File name
- Class name
- Constructor name
- Field Name
- Method name

When determining misspellings, it is necessary to determine whether character strings are similar. One way to measure the similarity is to measure the distance between strings, and there are many algorithms for calculating this distance. This time, we use the Levenshtein distance, where the edit cost of a string is used as the distance. In this algorithm, the weighting of each of replacement, deletion, and addition used as the edit distance is set to 1. The normalized value is used as the similarity value based on the longest string compared by measuring the edit distance.
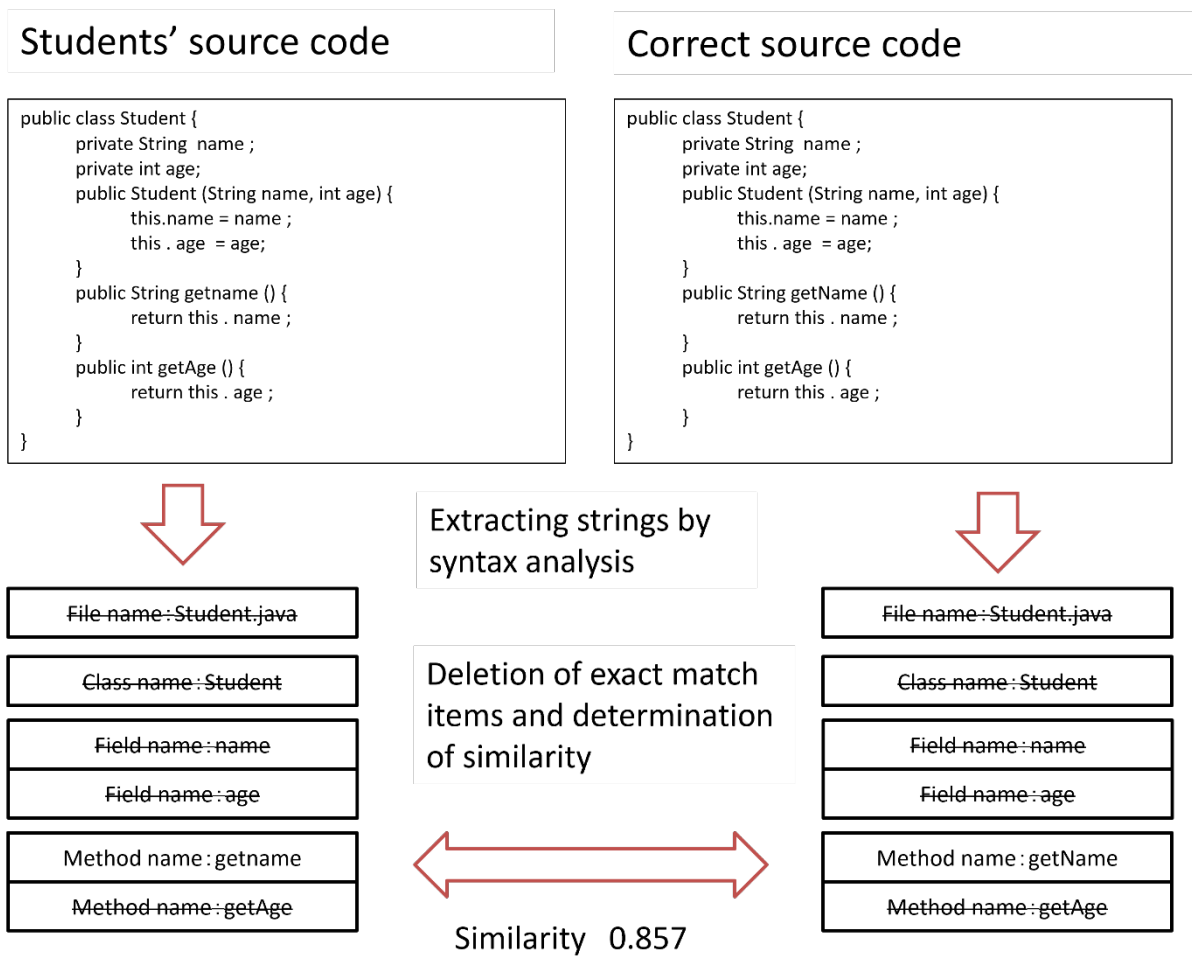
Figure 2: Example of algorithm for calculating similarity

Figure 2 shows an example of the algorithm for calculating the edit distance and similarity of the method names "getname" and "getName. First, a list of method names is created, and strings that match exactly are removed from the list. Then, misspelled strings are compared. Editing "getname" to "getName" requires a single edit, replacing "n" with "N". Since the strings compared have the same length of 7 characters, the similarity is 1 divided by 7 and the value subtracted from 1. In this example, the similarity is about 0.857. The Levenshtein distance was implemented using the API of Apache Lucene, a full-text search engine library.

The resulting misspelling information is then used to generate unit test source code for evaluation. Figure 3 shows how the unit test source code is generated using the spelling error information.
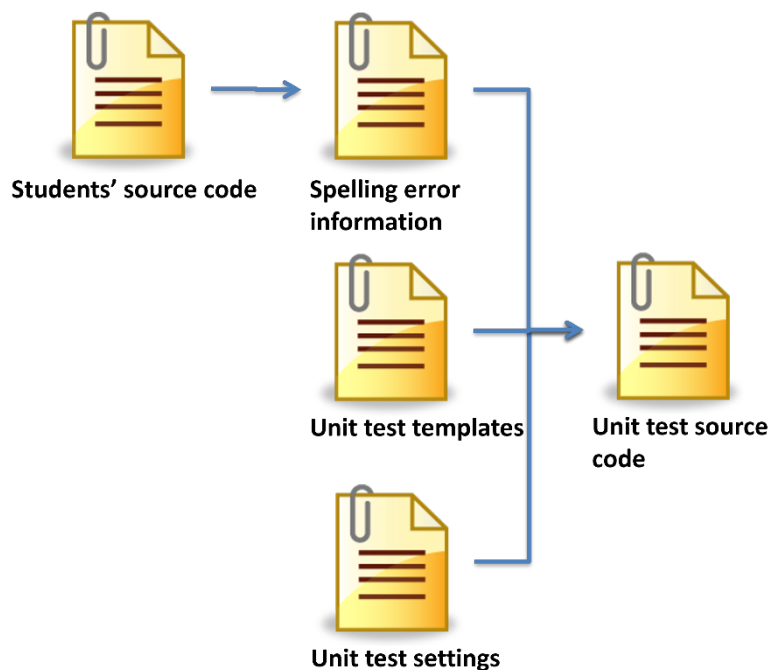
Figure 3: Unit Test Source Code Generation Methodology

Spelling error information is obtained from the program definition. The unit test configuration provides information on the conditions of the test and the values to be passed as arguments. The template that forms the framework of the unit test can then be used to generate the unit test code based on the misspellings. The template is processed using Groovy, and the unit test code dynamically generated by Groovy is used to execute the unit test. The class loader obtained from the compilation process is used to manage and execute the unit test code with a different namespace, even if the class names are the same.

Implementation on the Browser

In order to check the functionality of the source code analyzer in a browser, the tool was configured as a single JAR (Java ARchive) file. The scripting language Groovy was converted to Java bytecode, and libraries and code that did not work on Doppio were modified. BrowserFS, a related project of Doppio, was used for the file system on the browser. The source code analyzer has functions such as unit testing on a sandbox using Java Security and determining the character encoding of files, but these functions were omitted from this implementation.

Evaluating Behavior on the Browser

A source code analyzer was used to evaluate one issue on a browser. Google's Chrome was used as the browser. Figure 4 shows the actual operation of the tool, and it was confirmed that the source code was evaluated and the evaluation results were output as a CSV file without any visual change from the PC operation. It was also confirmed that the source code analyzer program was not loaded into the class loader in some of the unit tests.

Figure 4: Evaluating behavior on a browser

Conclusions

With the increasing importance of software in society, it is increasingly important to train engineers to develop software. We have developed a source code analyzer to identify errors in the source code of novice programmers. We then applied the tool to run on JavaVM, which is created in JavaScript, to make it easier to use on a browser. As a result, we confirmed that the functions of the tool worked on the browser with some exceptions. In the future, we plan to fix class loader-related problems and improve performance, and to build a learning site for programming.

Acknowledgements

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The Development on a Board Game to Promote an Information Literacy for Upper Secondary Students at the Srinakharinwirot University Prasarnmit

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Abstract

In today's information-rich landscape, cultivating effective information literacy skills is imperative for upper secondary students. This study focuses on developing a board game as an innovative tool to enhance information literacy among students at Srinakharinwirot University Prasarnmit Demonstration School (Secondary). Learning can be more enjoyable when gamified, and this research aims to achieve just that. By creating a unique board game, akin to traditional tabletop games, the study aims to equip students with the ability to discern reliable information from dubious sources. The interactive game immerses players in diverse scenarios, prompting them to evaluate the credibility of information encountered. This puzzle-like experience nurtures critical thinking and analytical skills, thereby fostering improved information comprehension. It's essential to address copyright considerations as well. Similar to how authors hold rights to their books, game creators possess ownership of their creations. Thus, respecting copyright is crucial in how the game is utilized. To gauge the game's efficacy, selected students will participate, followed by a comprehensive assessment cosisting a both a pre-test and a post-test. This approach will determine if the game effectively enhances information literacy skills. This research contributes a dynamic learning method that not only engages but educates. By blending entertainment with education, this innovative approach empowers students to navigate the sea of information competently. Ultimately, the fusion of fun and learning may greatly contribute to students' cognitive development.

Keywords: Information Literacy, Board Game, Upper Secondary Student

Introduction

Information access has evolved significantly in the digital age. According to the Thai Library Association (TLA) (n.d.), libraries play a crucial role in driving society toward a knowledge-based and learning-oriented direction. Moreover, the way we engage with books has transformed. In today's digital era, various forms of knowledge are accessible via the internet and portable technologies like tablet computers and smartphones. This allows learners to access information not only within but also outside the classroom. In this digital context, students have the opportunity to acquire knowledge anytime and anywhere, which empowers them to become discerning evaluators of information sources and enhances their overall digital literacy.

Information literacy encompasses the vital skills of discernment and the evaluation of information source credibility. These skills are indispensable in everyday life and collectively form what we refer to as Information Literacy. As articulated by Kampanat Coosirirat and Kobsook Kongmanus (2015), the ultimate aim of information literacy is to equip learners with proficiency in information-related skills, enabling them to apply these skills effectively across their educational, professional, and daily life endeavors. This objective primarily centers on the learner, emphasizing their ability to define their information needs, access required information efficiently, evaluate both the information itself and its sources, incorporate selected information into their existing knowledge base, and utilize this information effectively for various purposes. Therefore, information literacy emerges as a critical skill with applications spanning education, the workplace, and everyday life.

Figure 1, adapted from the UNESCO Information for All Programme (Link: https://www.unesco.org/en/ifap/information-literacy), visually represents the components of information literacy.

Information literacy empowers individuals from diverse backgrounds to effectively seek, evaluate, use, and create information for personal, social, occupational, and educational purposes. Emphasizing the significance of copyright is essential when individuals engage in information creation and consumption.

In Figure 1, we present information literacy as a guiding light in the information age, illuminating pathways to development, prosperity, and freedom within society. In today's digital landscape, where information is abundant and easily accessible, understanding and respecting copyright laws are integral aspects of information literacy.

Individuals with information literacy skills can access information related to various aspects of life, and they also uphold copyright laws and respect intellectual property rights.

In the digital realm, information literacy includes proficiency in using information and communication technologies while adhering to copyright and intellectual property rights. It also involves computer literacy, which relates to information and communication technology, and media literacy, encompassing the comprehension of various media formats used for information transmission. Responsible navigation of the internet and interpretation of multimedia content require both technical competence and a solid understanding of copyright principles.

A board game is a type of recreational activity that employs various pieces, cards, or models played on a specialized surface or board designed specifically for that game. Beyond providing entertainment and enjoyment, board games offer valuable opportunities for players to enhance their analytical thinking, planning, and decision-making skills (Kingkarn Buranasinvattanakul, 2019).

Sarinee Achavanuntakul (2021) notes that board games have surged in popularity, evident from the proliferation of board game stores and cafes across the country. The increasing availability of Thai-translated games, numbering in the hundreds and continually growing, coupled with the expanding Thai game design community, underscores this burgeoning trend.Utilizing games as an educational tool can yield positive outcomes in education due to their inherent characteristics. Games are inherently inclusive, transcending boundaries of race and religion, and they inherently challenge players, compelling them to grasp the strategies required to succeed (Sadanand Kaewsri, 2020). Creating learning experiences through board games thus serves as a medium for knowledge dissemination and as a means to foster interpersonal relationships among students. This approach is both enjoyable and entertaining, subtly nurturing a passion for reading.

Kaimuk Laosunthara (2022) found that students at Srinakharinwirot University Prasarnmit Demonstration School (Secondary), particularly those less engaged in social activities, expressed a willingness to visit the library, often due to invitations from friends. Therefore, developing board games aimed at enhancing information literacy and promoting reading can serve as an incentive for students to frequent the library and engage more with books.

It is crucial to develop board games tailored to upper secondary students to promote information literacy. Such initiatives enable students to acquire essential information literacy skills, equipping them to access appropriate and credible information sources and understand how to reference information correctly, including the creation of bibliographies following American Psychiatric Association (APA) standards. These endeavors not only prepare students for university-level education but also contribute to the development of lifelong learning skills. Considering the importance of this matter, I have created a board game with the aim of improving information literacy among upper secondary students at Srinakharinwirot University Prasarnmit Demonstration School (Secondary).
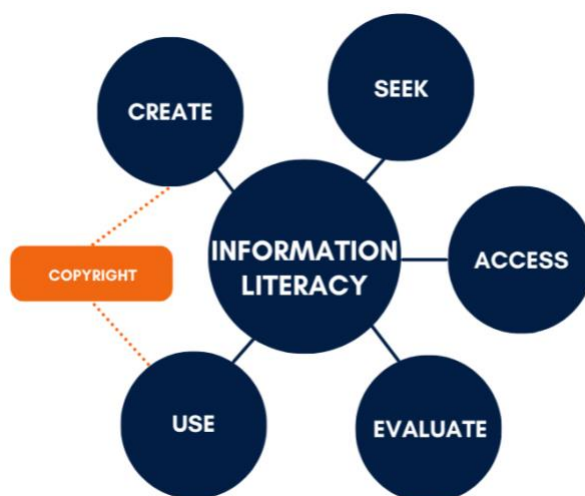
Figure 1: Information Literacy Adapted from UNESCO information for
All Progreamme https://www.unesco.org/en/ifap/information-literacy

Material and Methods

The study collected data from Upper Secondary students of Srinakharinwirot University Prasarnmit Demonstration School (Secondary) in Thailand during the academic year 2023. A sample group was selected to participate in board games to assess information literacy before and after playing. The study focused on one classroom, employing a specific method due to a potentially non-normally distributed population and a small sample size of approximately 30 participants. As a result, traditional statistical test parameters were not applied. Instead, the study utilized the Wilcoxon Signed-Rank Test (Sheskin David J.,2011).

Development of the Board Game

I have created an educational gamified learning resource named "COPY RIGHT?" that focuses on Information Literacy and Copyright Law.

Gaming Equipment

The gaming equipment for "COPY RIGHT?" consists of three sets of cards, as shown in Figure 2 Types of Cards. This figure provides an overview of the various cards and components used in the "COPY RIGHT?" board game, which is designed to promote information literacy and copyright knowledge. (a) Information Literacy Question cards (Front-side): These cards contain questions related to information literacy on their front side. Players will listen to these questions during the game, (b) Information Literacy Question cards (Back-side), (c) Copyright Question cards (Front-side): Similar to the Information Literacy Question cards, these cards contain questions related to copyright law on their front side, (d) Copyright Question cards (Back-side),(e-1)(e-2) a card used for tallying scores in the final round, associated with question number. These cards are used for keeping track of scores, especially in the final round of the game. They are associated with specific question numbers to ensure accurate scoring. (f) e-1 and e-2 (Back-side), (i) Signs for use in answering: Yes and No. These signs are used by players to indicate their answers to the questions posed during the game. Players must quickly tap the "Yes" or "No" sign to answer each question. These components collectively make up the game's playing cards and scoring system, enhancing the players' experience while also educating them about information literacy and copyright law.

Figure 2: Type of cards (a) Information Literacy Question cards (Front-side)
(b) Information Literacy Question cards (Back-side), (c) Copyright Question cards
(Front-side) (d) Copyright Question cards (Back-side), (e-1)(e-2) a card used for tallying
scores in the final round, associated with question number (f) e-1 and
e-2 (Back-side) (i) Signs for use in voting: Yes and No.

Experimental Trial of the Developed Game

For the experimental trial of the developed game, participants were recruited 1 class. This class has a total of 43 students. Of these, 37 students actively participated in the research, comprising 10 male students and 27 female students. The experimental trial was conducted on October 11, 2023. The experimental trial followed a structured timetable as presented in Table 1:Timetable of the Experimental Trial. During the initial 10 minutes, a designated facilitator takes on the role of the conductor. Their responsibility is to provide a comprehensive explanation of the game rules to all the participants. This phase is essential to ensure that all participants have a clear understanding of how the game "COPY RIGHT?" is played, including its objectives, rules, and scoring system. It sets the foundation for a fair and informed gameplay experience. Figure 3 represented Explanation about the game rules.

 The next 15 minutes involve active participation from all the participants. They are tasked with responding to a pretest questionnaire. This questionnaire likely contains questions related to information literacy and copyright knowledge. The purpose of this pretest is to establish a baseline understanding of the participants' knowledge in these areas before engaging in the game. It serves as a reference point for assessing the impact of the game on their knowledge. Figure 5(a)-(d) represented Trial of game.

The most substantial portion of the trial, lasting between 25 to 30 minutes, is dedicated to the actual gameplay. All participants actively take part in playing the game "COPY RIGHT?" This phase involves listening to questions, making quick decisions, tapping the appropriate response signs, and competing to earn question cards. It is the core of the experimental trial, where participants put their knowledge and skills to the test. Figure 4 represented After the game concludes, the participants spend the final 15 minutes responding to a posttest questionnaire. Similar to the pretest, this questionnaire likely contains questions related to

information literacy and copyright knowledge. Figure 6 represented Response to the Posttest questionnaire.

The posttest aims to measure the impact of playing the game on the participants' knowledge. By comparing their pretest and posttest scores, researchers can assess the effectiveness of the game as an educational tool.

Duration	Conductor	Contests
1) 10 min	Facilitator	Explanation about the game rules
2) 15 min	All participants	Response to the Pretest questionnaire
3) 25-30 min	All participants	Trial of the game
4) 15 min	All participants	Response to the Posttest questionnaire

Table 1: Timetable of the trial

Figure 3: Explanation about the game rules
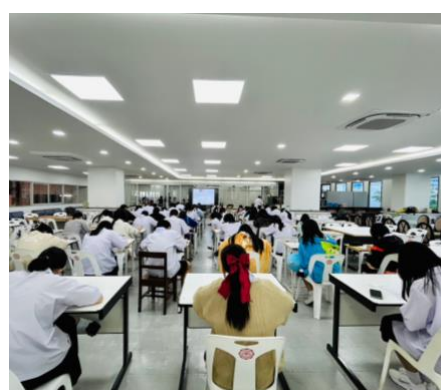
Figure 4: Response to the Pretest questionnaire

Figure 5(a): Trial of the game

Figure 5(b): Trial of the game

Figure 5(c): Trial of the game

Figure 5(d): Trial of the game

Figure 6: Response to the Posttest questionnaire

Results

Data Overview
In this analysis, data from two assessments (pre and post-learning) of 37 participants were used. The assessments covered 15 items and were divided into two categories: Category 1 (Information Literacy Skills) and Category 2 (Knowledge of Copyright Law).

Statistical Analysis
When a participant provides an incorrect answer, they receive a score of 0, while a correct answer earns them a score of 1.

Mean Scores and Standard Deviations
- The average score in Category 1 is 0.822 with a standard deviation of 0.130.
- The average score in Category 2 is 0.804 with a standard deviation of 0.141.

The Wilcoxon Signed-Rank Test for Both Categories
Category 1 (Information Literacy):
- Wilcoxon Signed-Rank Statistic: ($T = 28.5$)
- Two-Tailed p-Value: ($p < 0.001$) (indicating statistical significance)

The Wilcoxon signed-rank test for Category 1 indicates a statistically significant improvement in scores after the learning sessions.

Category 2 (Copyright Law Knowledge):
- Wilcoxon Signed-Rank Statistic: ($T = 15.5$)
- Two-Tailed p-Value: ($p < 0.002$) (indicating statistical significance)

The Wilcoxon signed-rank test for Category 2 also indicates a statistically significant improvement in scores after the learning sessions.

In both cases, the p-values are less than the conventional significance level of 0.05, suggesting that there is strong evidence to conclude that the learning program had a significant impact on improving scores in both Information Literacy and Copyright Law Knowledge.

Conclusions

The outcomes of the Wilcoxon signed-rank tests for both categories demonstrate a statistically significant improvement in scores after the learning sessions. In both cases, the p-values were less than the conventional significance level of 0.05, providing robust evidence to conclude that the learning program had a significant and positive impact on enhancing participants' Information Literacy Skills and Knowledge of Copyright Law. These results underscore the effectiveness of the educational intervention in improving participants' understanding and proficiency in these critical areas.

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Reflections on Using a Monitoring System for Participating Students in Work-Based Learning (WBL) Aimed at Developing the Adversity Quotient (AQ) Through Cloud Computing Technology

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Abstract
The aims of this research are 1) To study the level of Adversity Quotient (AQ) and the level of work behavior of students practicing in the Work-based Learning (WBL). of a college in Thailand and 2) To study the level of satisfaction in using the student monitoring system for practicing students in the work-based learning (WBL). The sample group the study consisted of 20 intern students and 20 interns from business establishments. The researcher used a test of Adversity Quotient (AQ), a student behavior assessment form. And satisfaction assessment form it is a tool for collecting data. The statistics used in data analysis include basic statistics, Percentage, Mean and Standard Deviation and t-test dependent. 1) The results of comparing the average scores before and after training found that the average scores of the adaptability and problem-solving skills test were higher after training than before training, with a score of $143.05 > 125.50$, and the average scores of the student work behavior test were higher after training than before training, with a score of $109.10 > 76.15$, which is statistically significant at the 0.01 level. And 2) the overall average satisfaction level is in the highest level of satisfaction ($\bar{x}= 4.64$). The area with the highest level of satisfaction is the student tracking process, followed by the supervision from the advising teacher.

Keywords: Satisfaction, Work Behavior, Adversity Quotient (AQ), Work-Based Learning

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Introduction

Society is undergoing rapid changes in the present, so it is necessary to train oneself to have abilities and skills in order to live a happy and successful life. Success depends only 20% on intelligence, while the rest is about social skills and emotional management. (Goleman, 1995) Therefore, current education aims to develop students in physical, mental, intellectual, and social aspects, emphasizing the importance of students having the ability to develop themselves according to their goals, resolve emotional conflicts, and adapt. In addition, there are four important goals for students to achieve success: 1) EQ (Emotional Quotient) - emotional intelligence, 2) IQ (Intelligent Quotient) - intellectual intelligence, 3) MQ (Moral Quotient) - morality, and 4) AQ (Adversity Quotient) - the ability to face and overcome challenges. (Stoltz, 2001) The Adversity Quotient (AQ) is the behavioral response to life's challenges, which can be developed through Stoltz's training. Stoltz believes that individuals who have the Adversity Quotient (AQ) can plan ahead, control themselves, persevere, and understand and utilize the abilities of others for their benefit (Stoltz,1997).

Promoting students' Adversity Quotient (AQ), which requires development, is essential. The Adversity Quotient (AQ) leads to students' happiness and success in achieving their goals. This study conducted experiments with a sample group of students undergoing work-based learning (WBL) in the first year of their bachelor's degree program in Innovation Trade Management, at a college in Thailand. The research aims are as follows:
  1.1 To study the level of students' Adversity Quotient (AQ) and their work performance behavior in the work-based learning. (WBL)
  1.2 To study the level of satisfaction in using the student internship monitoring system in the work-based learning. (WBL)

Literature Review

1. The Concept of Adversity Quotient (AQ)

The Adversity Quotient (AQ) is crucial for people in the modern era, as it is a key factor that leads to success in life and work. AQ is a concept introduced by Stoltz (1997), who categorized individuals into three groups. The first group is "The Quitter," who avoids challenges and tends to lack vision, dislike risks, and have less motivation in their work. The second group is "The Camper," who seeks convenient ways to avoid facing new obstacles and chooses a simpler life when confronted with adversity. The third group is "The Climber," who possesses high resilience, does not give up easily, and often becomes good leaders.

Stoltz (1997) divided the components of the Adversity Quotient (AQ) into 4 dimensions, collectively known as CO2RE: 1) Control (C), 2) Origin and Ownership (O2), 3) Reach (R), and 4) Endurance (E).

The Adversity Response Profile (ARP) test by Stoltz (1997) measures one's Adversity Quotient (AQ). It also explains the meaning of different levels of adversity response and resilience, as follows.

Score	Meaning
166 - 200	There is a tendency to have great resilience to major obstacles and the ability to move forward. Can use AQ techniques to develop their own potential and that of others.
135 - 165	There is a tendency to work well and thrive in challenging situations and have the potential to develop oneself using AQ techniques.
95 - 134	Can work well and achieve success as long as there are no significant obstacles. Often carries accumulated concerns, which makes it difficult to face challenging tasks. However, can use AQ techniques to develop their potential.
60 - 94	Has low potential in work. Obstacles can lead to setbacks and it is difficult to move forward. Must contend with feelings of helplessness and hopelessness. Can overcome these by developing AQ.
0 - 59	There is a tendency to endure various forms of suffering and adversity. Can increase motivation, energy, health, happiness, vitality, and enjoyment. Results in job performance, perseverance, and hope, can be achieved by using AQ techniques.

Stolz (1997) proposed a technique for developing AQ called The LEAD Sequence, which consists of 1) L (Listen to your adversity response), 2) E (Explore all origins and your ownership of the result), 3) A (Analyze the evidence), and 4) D (Do Something).

2. The Concept of Online Training

Online training is a systematic approach to learning that utilizes technology as a medium for knowledge transfer in order to enhance and support learning, increase learning efficiency, and address limitations in terms of location and time (Pimpir, 2017). In addition, Angelo (1993, as cited in Vichuda, 1999) proposed five fundamental principles of online training management, which are: 1) promoting continuous communication between trainees and trainers, 2) supporting the development of collaboration among trainees, 3) encouraging trainees to seek knowledge independently as active learners, 4) providing immediate feedback to trainees to help them assess their own abilities, and 5) facilitating limitless learning opportunities for anyone interested (Angelo, 1993, as cited in Vichuda, 1999).

The online training program is a form of media that allows trainees to acquire knowledge on their own, similar to a self-learning module. Raphin (2006) mentioned the components of a self-learning module as follows: 1) having clear objectives, 2) identifying target groups, 3) having components of interconnected objectives, 4) providing instructions, content, activities, and assessments, and 5) having a manual that explains the methods and conditions of use, as well as the answer key.

The process of creating an online training program, proposed by Chaiyong (2008), consists of the following steps: Step 1: Content analysis, which involves categorizing the content into subunits. Step 2: Learning activity planning. Step 3: Production of supporting media for the activities. Step 4: Testing the effectiveness of the training program.

The learning management system for online training consists of 5 components. 1) the Course Management system, which considers 3 user groups: learners, instructors, and system administrators. 2) the Content Management system and tools for creating content. 3) the Test and Evaluation System, which includes a question bank, random question generation, timed exams, and automated grading, along with reports on scores and attendance. 4) the Course

Tools system, which includes various tools for communication between learners and instructors, as well as learners with each other, such as web boards and chatrooms, with the ability to store data history. 5) the Data Management system, which includes file and folder management. Instructors have their own storage space for lesson materials, as determined by the system administrator.

3. The Concept of Cloud Computing Technology

The meaning of cloud computing technology, as stated by Danielson (2008) and Lin and Chen (2012), is as follows: It refers to the way computer users access and utilize services over the internet, where service providers share resources with users. This concept has evolved from the ideas and services of virtualization and web services. Users do not necessarily need technical knowledge of the underlying workings of these services.

The types of cloud computing technology, as categorized by Johnston (2009), can be divided into three formats: 1) Public Cloud or External Cloud, 2) Private Cloud or Internal Cloud, and 3) Hybrid Cloud. In addition, Mell and Grance (2011) have classified the service models of cloud computing into three formats: 1) Software as a Service (SaaS), 2) Platform as a Service (PaaS), and 3) Infrastructure as a Service (IaaS).

For types of software on cloud computing technology, Arron (2017) has classified tools into 4 categories as follows: 1) File Storage tools, 2) File Synchronization tools, 3) Document Creation tools, and 4) Collaboration tools.

The aforementioned concept has been divided into three components by the researchers, which are 1) users, 2) the process of monitoring and caring for students, and 3) cloud computing technology. The student monitoring and care system is built on a Hybrid Cloud network, utilizing Software as a Service (SaaS) cloud services, and is connected to the Google Workspace for Education learning support toolset.

4. The Theory Related to Satisfaction

"Satisfaction" refers to the state of emotions and shared experiences that individuals have towards the effectiveness and success of activities that lead to a predetermined goal. In another sense, satisfaction is a feeling in terms of evaluation that is an important component of learning, which relates to the performance outcomes of individual learning experiences (Namluea, 2015; Morse, 1958; Good, 1973; Wolman, 1973; Davis, 1981; Vroom, 1990; Newstrom and Davis, 2002).

The method of evaluating satisfaction is to assess the value of feelings in terms of satisfaction and dissatisfaction, in terms of magnitude. There are three aspects to assessing satisfaction: 1) emotional aspect, 2) cognitive aspect, and 3) behavioral aspect. It is a measurement of readiness to act or respond to the causes of behavior.

Methodology

1. Population and Sample Group

The sample group used in this research consists of 1) 20 internship students and 2) training teachers from the workplace. The selection method for the sample group is purposive

sampling, which means selecting from the workplaces where the volunteer internship students are currently practicing.

2. Research Tools

> 3.2.1 Work-Based Learning (WBL) for Monitoring and Supporting Student Internships in the Learning-Work Integration System.
>
> 3.2.2 Development Plan for Enhancing Adversity Quotient (AQ) through Cloud Computing Technology.
>
> 3.2.3 Assessment of Students' Resilience and Adversity Quotient (AQ) during their Internship.
>
> 3.2.4 Evaluation of Students' Work Performance and Behavior during their Internship.
>
> 3.2.5 Satisfaction Survey for Students on the Work-Based Learning (WBL), which aims to enhance their resilience and Adversity Quotient (AQ) through cloud computing technology. This evaluation form consists of a 5-point rating scale.

3. Data Collection

This research is a single-group experimental design that measures the level of Adversity Quotient (AQ), as well as the work performance behavior of students, before and after the experiment (The One-Group Pre-test, Post-test Design). The duration of the experiment is 8 weeks in order to study the Adversity Quotient (AQ), as well as the work performance behavior of students. As follows:

Step 1: Have the sample group participate in an 8-week trial of the Student Practice and Professional Development (SP^4D) tracking system. The system consists of 3 components:
- Component 1: INPUT, which includes the following users: 1) Faculty Advisors: They are responsible for managing content, activity rooms, and data of both faculty and students. They track and manage interaction data, exchange opinions between students and faculty advisors, as well as among students. They work together to follow the SP^4D Model's tracking and supervision process. 2) Students: They are responsible for recording data, taking tests, and participating in activities to develop their skills and overcome obstacles according to the SP4D Model's tracking and supervision process.
- Component 2: PROCESS, of the SP^4D Model 6 includes the following steps: 1) Introduction and screening, 2) Goal setting and planning, 3) Student support and development, 4) Prevention and correction, 5) Referral for problem-solving, and 6) Data collection and summarization.
- Component 3: OUTPUT, consists of Google Classroom/Meet for organizing activities, Google Forms for conducting tests, and Google Drive for storing student data, as shown in Figure 1.
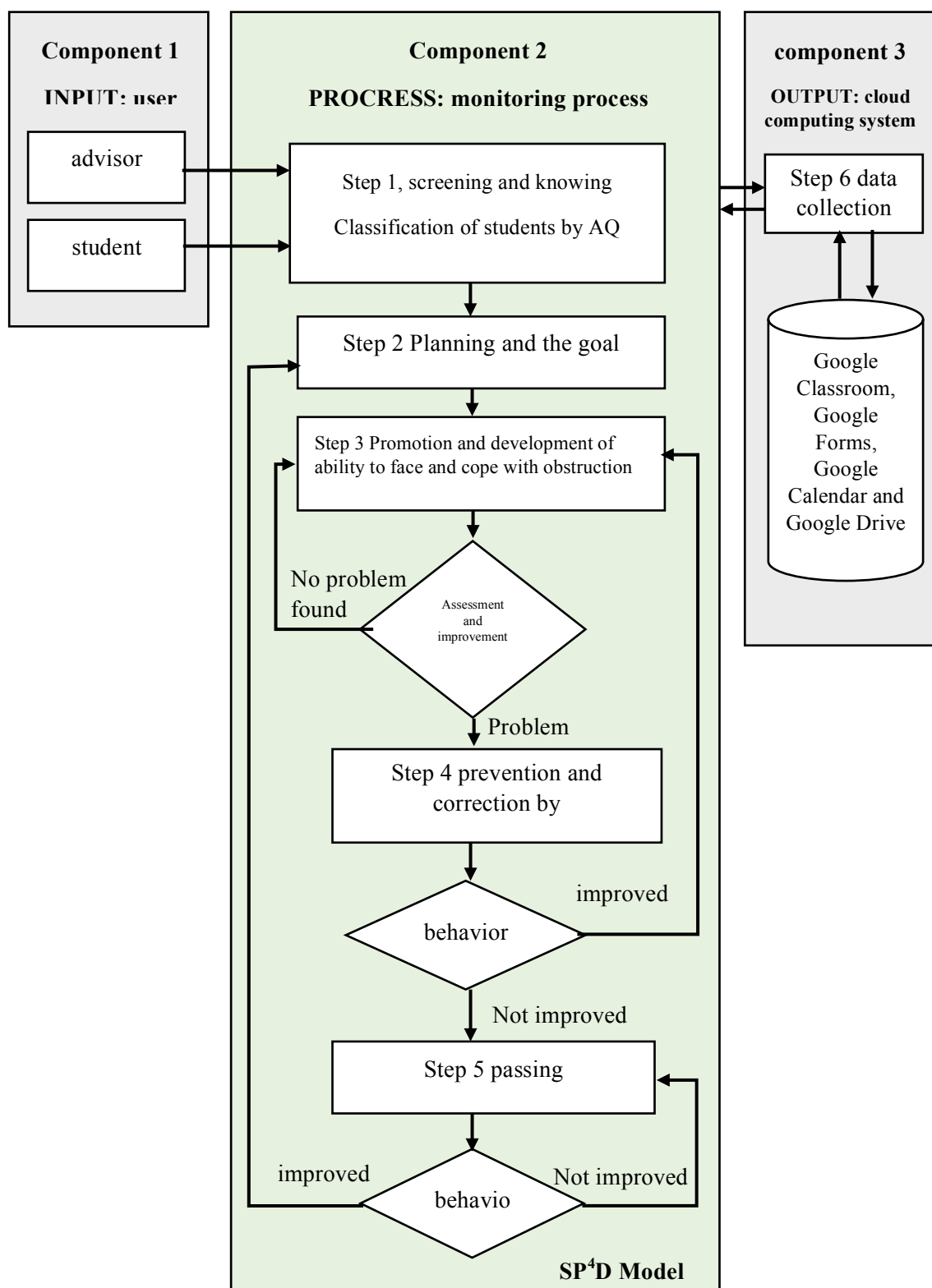
Figure 1: A system for tracking and supervising students' work-based learning, in conjunction with their academic studies, to enhance their Adversity Quotient (AQ) through cloud computing technology.

Along with the internship students, participate in activities to develop skills in Adversity Quotient (AQ) through cloud computing technology. This can be explained from the example of an activity plan as follows:

Activity Plan for Developing Skills in Adversity Quotient (AQ) through Cloud Computing Technology:

Unit Activity 1: Introduction and Screening, with the following steps:

1) Students complete the activity "Who are you" through Google Form.

2) Students check their own scores to determine which personality group they belong to.

3) Use Google Slide to explain various personality traits.

4) Divide the students into small discussion groups according to their personality traits.

5) Each group of students completes the activity "Paths of Life" through Google Jamboard.

6) Students brainstorm and identify individuals they have encountered during their internship, and determine which component of the tree of life they represent, along with explaining the reasons and posing the question "How can the tree of life be nurtured and cared for to grow well?" This activity illustrates different roles, demonstrates the interconnectedness, and highlights the necessary skills.

7) Summarize the activities.

Step 2: Evaluate the students' Adversity Quotient (AQ) during their internship. Here are some examples of assessment questions.

---

1. Your coworker does not listen to your opinions or suggestions?
The reason why my colleague does not listen to my opinions or suggestions is because...

I can't control or manage.　| 1 | 2 | 3 | 4 | 5 |　I can control or manage.

C-

The reason why my colleague refuses to accept my opinion or proposal actually comes from...

Myself　| 1 | 2 | 3 | 4 | 5 |　Other people or other factors

OR-

---

2. **What if there is no response to your proposal at the meeting?**
The reason why no one accepts my proposal is because...

Myself　| 1 | 2 | 3 | 4 | 5 |　The situation at that time.

R-

The reason why no one accepts my proposal is...

Always happened to me　| 1 | 2 | 3 | 4 | 5 |　It will never happen to me again

E-

Step 3: weeks 4 and 8, deliver the student work behavior assessment form, version 1, to the company's training supervisor, a total of 20 sets. Explain the purpose of sending the assessment form, to request cooperation in data collection.

Step 4: conduct interviews and have the sample group complete the satisfaction assessment form regarding the student internship monitoring system, a total of 20 sets.

4. The Statistics Used for Data Analysis

Statistics in analyzing the level of abilities to Adversity Quotient (AQ), as well as the level of abilities and work behavior of students before and after the experiment using dependent t-test statistics, and analyzing based on the satisfaction of students towards the student internship tracking system using basic statistics such as percentage, mean, standard deviation, and interview findings.

Results

1. The Level of an Adversity Quotient (AQ) and the Level of Work Performance Behavior of Interns

The results of the comparison of average scores in the test measuring the level of Adversity Quotient (AQ) are presented in Table 1, and the results of the comparison of average scores measuring the level of performance in student internships are presented in Table 2.

(n=20)

level	Full score	$\bar{x}$	S.D.	t-test	Df	Sig.
Pre-training	200	125.50	15.35	6.90	19.00	0.00**
Post-training	200	143.05	8.26			

** Statistically significant at the level of .01

Table 1: The results of comparing average scores (means) measuring the level of Adversity Quotient. (AQ)

According to Table 1, the results of comparing the average scores of the Adversity Quotient. (AQ) of students before and after practical training showed that the level of Adversity Quotient. (AQ) after training is significantly higher than before training at a statistically significant level of .01 ($\bar{x}_2$ = 143.05, S.D. = 8.26), ($\bar{x}_1$ = 125.50, S.D. = 15.35).

(n=20)

level	Full score	$\bar{x}$	S.D.	Df	t-test	Sig.
pre-training	120	76.15	33.29	19.00	27.12	0.00**
post-training	120	109.10	81.88			

** Statistically significant at the level of .01

Table 2: The results of mean scores measuring the performance level of intern students in the Work-based Learning. (WBL)

According to Table 2, the average score of students' work behavior before and after training was compared. The average score after training ($\bar{x}_2$ = 109.10, S.D. = 81.88) was significantly higher than before training ($\bar{x}_1$ = 76.15, S.D. = 33.29) with a statistical significance of .01.

2. The Result of Satisfaction Levels in Using the Student Internship Monitoring System

The satisfaction of students undergoing work-based learning (WBL) in the learning and working system, coupled with cloud computing technology, is shown in Table 3.

Issues/Topics for consideration	$\bar{x}$	S.D.	Satisfaction level
Issue 1: Supervision from supervisory teachers.	4.57	0.50	The most
Issue 2: Student monitoring process	4.66	0.48	The most
Issue 3: Development activities AQ	4.48	0.60	The most
Issue 4: Cloud computing technology	4.23	0.73	The most
Total average	**4.64**	**0.53**	The most

Table 3: The level of satisfaction of the intern students towards the WBL monitoring system to develop the Adversity Quotient. (AQ) through cloud computing technology

From Table 3, the satisfaction level of internship students towards the student tracking system was found to be the highest overall ($\bar{x}$ = 4.64, S.D. = 0.53). When considering the individual aspects of satisfaction, the highest level of satisfaction was found in the aspect of student tracking and monitoring processes ($\bar{x}$ = 4.66, S.D. = 0.48). Following that, in descending order, were the aspects of supervision from advisors, AQ development activities, and finally, cloud computing technology.

The feedback reflects the feelings about the activities and the use of the student internship monitoring system from the student interviews.

> It is a good idea for this type of technology system. It is a comprehensive system that can help with problem tracking and student monitoring conveniently. Tracking through technology without difficulty and notifying in advance so that we can stay informed all the time, making us feel like there is a teacher taking care of us and providing assistance throughout. Impressed with the 3 steps of AQ development process, it helps us understand ourselves and others' personalities, which can be applied to work or to understand each customer's personality and how to handle it.

Another person said:

> The teacher pays great attention to details and takes good care. It is a good tracking system that is easy to understand and not overly complicated, allowing students to understand clearly, especially the development of AQ that is suitable for work and has AQ measurement.

Another comment is:

> I feel good because there is a teacher who always provides advice and thoughts. The teacher cares about following up with students during internships, making us feel close to the teacher and there is advance notification for appointments to solve problems, which allows us to prepare in advance. We receive systematic problem-

solving and have the opportunity to practice problem-solving on our own. It is very beneficial.

Discussion

1) The results of the study on the level of Adversity Quotient. (AQ) and the level of work behavior of Work-based Learning (WBL) students found that the average scores of Adversity Quotient. (AQ) and the work behavior were higher after training compared to before training.

This may be due to the Work-based Learning (WBL), which involves a process where 1) individual students are identified and screened through online training activities,2) goals and objectives are planned and established, 3) advisors help promote and develop students, 4) assistance is provided in identifying and solving problems, 5) systematic solutions are implemented for persistent issues, 6) data is collected and summarized, and continuous support is provided to students. However, a study by Thitinada and Yuwadee (2019) found that there were problems with the student tracking and support system, such as the lack of a process and operational steps, advisors lacking technical skills and knowledge in the system, and a lack of continuity. Therefore, advisors need to have a good understanding of the student tracking and support system, as well as engage in continuous development and collaborative work (Awutai, 2013). Additionally, Nattarin (2014) studied the management module of the student support system in a school under the Royal Patronage, which consists of four components: student data system, operational student support system, support services, and problem prevention and solving. The core of the student tracking and support system is control and coordination, effective communication, which can help reduce obstacles and challenges (Awutai, 2013).

2) The results of the study on satisfaction levels in using the student internship monitoring system found that the overall satisfaction level is the highest. This may be because the study follows a systematic process, examines the current situation, identifies problems, and analyzes and integrates appropriate tools. As a result, the evaluation of the monitoring process aligns with Kittisak et al. (2015), who found issues in supervision and monitoring, as well as the need for guidance and systematic monitoring of students, especially by teachers and educational institutions. It is recommended to establish a systematic and continuous monitoring system that includes tracking progress and promotes teacher knowledge and understanding of activities, leading to more practical implementation (Nanthawat, 2022). Furthermore, when considering the findings, the highest satisfaction level is "being able to apply the knowledge gained from participating in activities in daily life," followed by "being able to apply the knowledge gained from participating in activities in work." This may be due to the internship monitoring system, which includes online training activities that enhance students' abilities to face and overcome challenges through cloud computing technology. Some interesting points include:

- The process of developing and promoting the Adversity Quotient (AQ) using The LEAD Sequence technique by Stoltz (1997) focuses on training listening and perception skills to respond to problem-solving challenges. It involves researching the root cause of obstacles, analyzing the possibilities for solving them, and enhancing one's own capabilities. Choosing a method and taking action to eliminate obstacles can help control their impact on life. This is consistent with Jinda (2013) study on training methods to enhance the Adversity Quotient. (AQ) in early childhood education. It can

stimulate the growth of the Adversity Quotient. (AQ) within individuals and students become aware of the importance of training that directly influences their mental development to foster the Adversity Quotient (AQ).

- The steps for organizing online training activities result in students gaining hands-on experience from participating in activities and continuously evaluating themselves, enabling them to learn independently. They can engage in knowledge exchange, thoughts, experiences, and problem analysis that are of interest to them. There are techniques to promote team understanding and problem analysis together, making students feel capable, accepted, and valued, leading to their ability to ultimately solve problems. Activities foster collaboration, constant communication, even if students do not encounter problems and obstacles. According to Garg and Singh (2022), they studied the online training format in India and found that online training is an effective tool for transferring knowledge. It allows learning according to the abilities and potential of the trainees, as well as the necessity of using information technology.

- The selection of suitable cloud computing technology enables trainees to easily access and use data anytime, anywhere (Bindu, 2016). This helps reduce the burden of data storage and ensures relevance to keep up with changes, leading to the creation of knowledge that can be applied in future caregiver development by consulting teachers (Krittinicha, 2021)

As mentioned above, it demonstrates the alignment of the student internship monitoring system, which includes the steps of monitoring and activities to promote and develop students' Adversity Quotient (AQ).

Conclusion

The Work-based Learning (WBL) tracks and supports students' internships in conjunction with their learning process. It promotes students' readiness for practical work experience and equips them with information, media, and technology skills. It enhances both their personal and professional lives by integrating real-world professional experiences with classroom learning. This allows students to become familiar with the realities of the working world before completing their education. Learning in a professional setting is widely recognized as a means to develop students in various aspects beyond traditional classroom learning. Therefore, if educational institutions have a system in place to closely monitor and support students during their studies and internships, while also developing activities to enhance their Adversity Quotient (AQ), it would be of great benefit to students when they encounter challenges in their internships, studies, and daily lives. This ultimately results in equipping students with problem-solving skills, enabling them to overcome obstacles in the end.

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Teaching Design in the Wake of Artificial Intelligence

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Abstract

In order to maintain its relevance and pertinence throughout history, Design Teaching has been pushed to regularly evaluate its adequacy in the face of cutting-edge technologies and constantly renewed tools. In that respect, the new paradigm of Generative Artificial Intelligence pushes once more the territorial limits of Educational Research and Pedagogy. In this study, we describe the implementation of Educational Methodologies to teach Design to Architecture Students in a Professional Degree Program in Mexico. This Methodology makes students acquainted with Design Fundamentals and later incorporates internet technologies as a support tool that grants them access to an expanding database of form and geometry configurations. The incorporation of 3D Modeling Digital Tools complements a process that aims to endow students with the capacity to understand and create space from within the manipulation of form and geometry and promotes the burst of new formal configurations within the student´s creative process. We base this process on the notions of Systems Theory and claim Design Teaching is a cohesive cluster of interrelated components. It is under this premise that we also claim that the new possibilities granted by Artificial Intelligence can be seen as another component within this system. Beyond the initial reluctance to incorporate AI to its Design Methodologies, the Design Disciplines should see AI as a tool that generates variations with radical speed, and therefore invaluable in its role as an aid to the Design process but nevertheless, incapable of generating new formal configurations by itself.

Keywords: Design Pedagogy, Systems Theory, Generative Artificial Intelligence

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Introduction

Like many of its foundational principles, the Bauhaus' visionary design curriculum remains to this date an undisputed reference, whether by emulation or by opposition, to most Design School's curriculum in the world. Its core pedagogy principles are taken from the 1919 manifesto written by Walter Gropius which was later integrated in the famous concentric ring stages diagram that defined studies through the Bauhaus' four and a half year courses.

The Bauhaus remained active from 1919 to 1933 and started its operations in the city of Weimar with Gropius acting as its first director. Gropius was profoundly influenced by the theoretical foundations of the *Deutscher Werkbund* founded by Herman Muthesius.[1] He was also deeply aware of the work and the discussions prompted by his contemporaries in other parts of Europe and America like Peter Behrens, Henry van de Velde, Josef Hoffmann, Joseph Maria Olbrich or Louis Sullivan.[2] His understanding of the *zeitgeist* and the fundamental change of paradigm within the new machine age has proven to be foretelling given the 100-year-old longevity of his ideas and pedagogical principles instilled in the Bauhaus.

One of the core principles embedded within the Bauhaus curriculum is the pedagogical strategy of immersing its students in a compulsory one-and-a-half-year Preliminary Course. Regardless of the final output of the following three-year workshop studies, the Preliminary Course was considered essential in the Bauhaus curriculum due to its emphasis on Basic Formal Studies. These were regarded as foundational within all design disciplines and considered a methodological bridge to the following stage of Spatial, Color and Composition Studies.

The Bauhaus curriculum tried to respond to the need of *"a new and powerful working correlation of all processes of creation"* (Bayer, 1938, p.30). Prioritizing an abstract level of Formal control and Geometric manipulation at the Preliminary Course proved then to be a revolutionary teaching strategy and it is still the basis of many contemporary Educational Methodologies. Despite one hundred years of technical developments within the realm of representation tools its core Pedagogical method remains practically intact in many Design Schools around the world.

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[1] Being the youngest of the *Deutsche Werkbund* leaders (Bayer, 1938, p.13), Gropius can be considered an important link between this association's ideas of seeking a synthesis between the "machine style" and the "arts and crafts" movement, and the development of the objectives and theoretical fundaments of Modern Movement of architecture.

[2] These architects are the most direct representatives of the avant-garde movements, preceding the Modern architecture. Their work was parallel regarding ideas despite they were located in distinct geographical contexts such as Germany, Belgium, Austria and the United States.
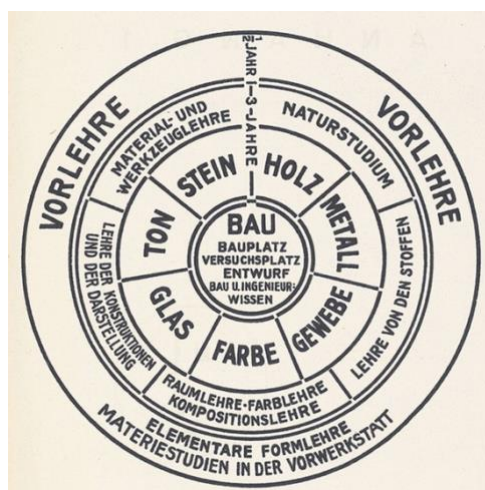
Figure 1: Diagram of the Bauhaus curriculum.
Walter Gropius, 1922. Lithograph. 20.2 x 29.3 cm. Satzungen Staatliches Bauhaus in Weimar (Statutes of the State Bauhaus in Weimar), July 1922. Bauhaus Typography Collection, 1919–1937. The Getty Research Institute, 850513.
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The strength of this pedagogical system relies on the initial approach to Form, Matter and Space from a conceptual and abstract departure point in order to develop the following stages of figurative and technical development in parallel with the growth of the student´s level of technical knowledge. This system also allows a critical and analytical awareness to develop within the students' own process while releasing his or her creative input.

> Practical and theoretical studies are carried on simultaneously in order to release the creative powers of the student, to help him grasp the physical nature of materials and the basic laws of design. Concentration on any particular stylistic movement is obviously avoided. Observation and representation -with the intention of showing the desired identity of Form and Content- define the limits of the preliminary course. (Bayer, 1938, p.26)

Like many Design Schools founded during the second half of the XX century, the School of Habitat at the UASLP in Mexico, was founded owing a great degree of influence to the Bauhaus system.

The School opened in 1972 offering the Architecture degree program and its educational platform grew to offer degrees in Graphic Design and Industrial Design a couple of years later. The combination of these three degrees presented an ideal scenario for the implementation of a common Preliminary Course during their first year of training and a structured curriculum strategy that shared many common departmentalized courses the following years. The basic structure of the Architecture curriculum at the UASLP assimilated the three stages present in the Bauhaus curriculum: Conceptual, Instrumental and Specification.

One crucial difference between the two systems is the output in the UASLP curriculum final stage. Given the role of public professional education in Mexico, the capacity of granting a professional degree at the end of a six-year curriculum was considered of the utter most importance. The UASLP curriculum leads to a legal license to practice in the professional field. This third stage in the Bauhaus system was embedded from the beginning with a certain degree

of uncertainty. Its duration, level of academic and practical achievement defined by individual *"special circumstances"* (Bayer, 1938, p.26).

The above is mentioned to highlight the natural inclination in the UASLP system and its faculty to overstate the importance of the Specification stage and introduce knowledge based on technical and constructive skills from early conceptual stages. This, historically represented the risk of undermining the importance of the progressive evolution from conceptual to figurative in its educational system.

It is in this context where a recent interest among the School of Habitat faculty has risen to address the need to update and strengthen the transition between the Conceptual and Instrumental stages. This interest revolves around informing its Bauhaus methodology *vis-a-vis* contemporary theoretical developments, new lines of pedagogical inquiry and research as well as the undeniable presence of digital tools and new representation techniques.

The Theory of Form

A student enrolled in the Architecture program at the UASLP receives a practical course of Design Fundamentals during his/her first semester. This sets a practical foundation to understand the rules of form, composition, rhythm, proportion and scale. The following three semesters belong to the Conceptual stage which is developed through Design Studios that teach a consolidated methodology across project-based design exercises. This stage develops the skill to create architectural concepts capable to respond to any given programmatic needs and apply them to any imaginable site or context. And more importantly, do so while answering to the need of creating relevant form, space and geometrical configurations while responding to specific perceptual, existential and functional requirements. It is across the three levels that comprehend the Conceptual stage that an alternative methodology has been implemented. This strategy has been applied over the last six semesters at the Architecture program at the UASLP and its initial results are presented here.

A recurrent concern within this proposed Methodology is how to introduce and guide students properly into the world of Abstract Form and manipulation of Geometry as the steering Pedagogical strategy. In many ways, students enrolled to the Architecture program, whether they are aware of it or not, arrive with the natural expectation of understanding Architecture through the experiences occurred inside buildings they have inhabited. This implies that their understanding of Space, Form and Matter, previous to their arrival to the Architecture program is mediated by, or understood as, a confusing agglomeration of building components. It is very common to find students within the initial semester of the Preliminary Course eager to address Design, Architecture and Space as a consequence of hierarchizing very specific construction components such as walls, windows, doors, columns, ceilings, facades, stairs or hallways.

The strategy proposed here assumes that, at least during the initial stages of the student´s education, Architecture is not understood as a combination of construction components. It relies on the process taking place within the thematic progression from conceptual to instrumental stages proposed in the program curriculum. That process starts with an understanding of Geometry as a container of Space and with the students' abilities to develop, manipulate and control Abstract Form. At that point, it becomes crucial to make implicit the connection of subjects and skills developed by previous courses like Descriptive Geometry and the essential role they are about to play in the proposed Design Studio Methodology.

In this way, the initial tools given to the students within Design Studio are expected to be recognized as tools already present in their skill set. Among these are notions already studied as pure Geometry Typologies or as result of Geometrical Operations. It is expected that through the lens of design exercises the students understand these as Formal typologies used in the development of three-dimensional space: Orthogonal, Pyramidal, Polyhedral, Spherical, Curvilinear. In parallel, the students receive two more notions crucial to manipulate form: Formal Configurations of three-dimensional space (Solids, laminars, frames, voids) and Material Configurations of three-dimensional space (Transparency, translucency, shininess, texture, color). As mentioned before, these notions evolve from topics addressed in Geometry courses into Design Studio Tools through applied design exercises and, in most cases, these exercises imply the creation of physical models and formal archetypes already capable of responding to function, context or perceptual requirements.

A second crucial aspect of this Methodology is the conflict faced by the student *vis-à-vis* the need of creating variations of geometrical operations, iterations of physical models or recursive formal compositions given their early control over Geometry and Form. Here the question is how to introduce the students to grasp the myriad of possible configurations capable to emerge from manipulating Form at conceptual and abstract levels.

The proposed solution to this problem has been taken from the theoretical work of the German philosopher Niklas Luhman and his contribution to the field of Systems Theory. Luhman's work represents an approachable theoretical background to the challenge of developing new formal configurations within preexisting formal typologies. As explained before, this is an essential concern given the speculative nature of the work developed by students in the Design Studio exercises.

Luhman claims (2000, p.26-28) that the emergence (creation) of new Forms is done on the basis of processing its qualities within a Social System. He identifies the participation of perception and communication within this System and claims that these are principles active within the process of creating Art Forms. He explains that Art is, in its modern sense, a functional equivalent of language: its purpose is to launch a specific type of communication that uses the capacity of perception (or imagination) of Forms to undertake the "search of meaning". New Form is introduced into the environment of the System, differentiating itself from the rest and provoking communication that occurs from its perceived differences. The triggering effect of the specific difference launches a specific type of communication, a form that, by modifying the state of the system, becomes information: as a "difference that makes a difference."[3]

N. Luhmann deepens into the Theory of Form based on difference and claims that it is the operation of distinction which introduces Form into the world and makes it observable. Being able to observe one's difference from the rest becomes necessary to recognize one's own form and therefore, the specifics of Form are only possible to recognize in relation, in comparison, to everything else that exists in the world.

On the other hand, N. Luhmann also explains that when distinctions are marked as Forms two things are ensured: they can be distinguished and they can be reproduced. This is important because, while perception works with unformed distinctions, communication presupposes (is

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[3] Although, in the field of social sciences, this phrase is usually attributed to Luhman, he actually mentioned to have taken it from the biologist, anthropologist, social scientist and linguist Gregory Bateson (2000, p.26).

based on) the elaboration of new Forms. This happens in two ways: First, as a condition within the concurrence of various psychic systems (the consciousness that perceives them) who notice the Forms due to their specific difference. Second, to guarantee the linking capacity of communication. Communication resorts to what has already been communicated and anticipates other possible communications, that is, the presence of *recursiveness* at the time of any communicative operation. This must be understood for all communication, and especially for the communication of Art that relies on self-produced Forms in the realm of the perceptible. It can also be deduced that the meaning of Art Forms is to make themselves available for subsequent operations within the communication system.

The way in which Luhman's theory gets inserted within this Pedagogic strategy relates directly to the aesthetic component within the Forms of Architecture. A component that has to do with its perception and what they communicate or contribute to us. Therefore, there are two elements directly related to this Methodology; the communicative quality within the aesthetic condition of the Forms of Architecture and the *recursiveness* of new Forms implicit in the creation of communication.

Thus, its application presupposes that the qualities of the Architectural Form are recognized and processed in the environment of the System of Architecture. Within this System each Form's contribution relates directly to its specific difference or to its own configuration characteristics.

It is possible to deduce then, that initial Formal configurations based on Geometrical qualities are already recognized typologies. Therefore, the knowledge of the already achieved Formal typologies becomes instrumental to the student's immersion in the System of Architecture. Hence the importance of providing from the early stages of this Methodology a documented or collected storage of Formal typologies.

Pinterest Database

Given the *recursiveness* necessary for operating and processing new Forms within the System of Architecture, it is important to remember that the storage of Architectural Forms and their qualities has historically occurred in archives, books and specialized magazines. However, digital resources and web-based digital archives offer new possibilities to the dynamics of processing and storing Formal typologies.

With this in mind, the use of the Pinterest platform has been integrated into this Methodology and into the workflow of Design Studio exercises of the first four semesters of the Architecture program. This promotes the student´s immersion into the management of Form and Space at an abstract level while offering tools that facilitate the student´s knowledge of existing Formal Typologies and configuration possibilities.

Pinterest ("All about Pinterest," 2023) is a platform that allows users to create and manage collections of images on themed personal boards. Its interface follows a structure of canvas or boards on which photos of the topics of interest are pinned.

Unlike other social network platforms, Pinterest´s workflow is not based on the possibility of users expressing themselves through texts and images of their exclusive authorship but rather through the selection of images already existing on the platform. This ability to search, select

and collect images on thematic boards is what represents a great technological advantage in the learning process described previously.
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Pinterest stands out for its ability to store, classify and order images in thematic boards. The platform generates and offers a series of similar images to follow the search process based on its user's preferences. Therefore, its constant use implies an enrichment between the user and the image suggestions.

The automatic update recommends a personalized feed, so that the following search is carried out in relation to the user's specific interests. This is not unlike the implemented algorithms in entertainment streaming platforms, web search sites or even the basic logic behind Artificial Intelligence.

The platform also offers the possibility of working on collective boards. This implies that several users deposit selected images which implies that the level of specificity and accuracy of the topic is enriched with a much greater speed.

Boards can be formed in advance by instructors and teachers who present a selection of images as a guideline to introduce purposes or objectives to be tackled on any given Design Studio exercise.
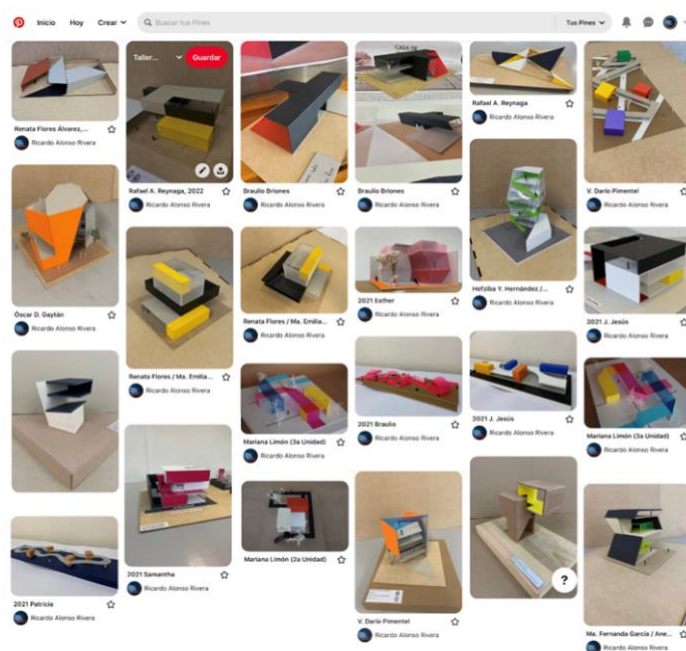
Figure 2: Student work display on a Pinterest board.
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3D Digital Tools

It is important to highlight that beyond traditional media such as drawing or physical models, the technology behind architectural representation has also moved towards very advanced digital resources in the generation and manipulation of three-dimensional Form.

In the traditional sense of the discipline, Form along with its configurations and iterations have usually been worked on sketches or scale models. But since the 1980s, digital tools that enhance

the possibilities of this process have made an important mark in the field. It is important to emphasize that these tools, propelled by the speed of digital processes, are also inscribed within the mechanisms of communication, self-production and generation of recursion described by N. Luhmann.

Under this logic, digital tools cover the role of accelerated facilitators of these processes and become fundamental pieces of this teaching Methodology in line with the technological possibilities of our time. Just as the Pinterest platform becomes an accelerated mechanism to document, archive and document graphic collections, digital 3D tools generate accelerated processes to project, manipulate and visualize Geometry and Form and it becomes an invaluable tool to generate Formal *recursiveness* at an accelerated speed.

The specific interest in recognizing digital tools as a fundamental piece of this Methodology responds, in part, to the indisputable hegemony that digital media professes in every aspect of the production, representation and dissemination of Architectural Design and Discourse. It also responds to the need to explore and define the still emerging role that digital tools must play as part of the comprehensive learning process described here.

With this in mind, the following steps in this Methodology are grounded in the use of specific digital applications: Autodesk 3ds Max (formerly 3D Studio Max) and Rhinoceros from the company Robert McNeel & Associates (Rhino). This is presented as a progressive link within the process described so far and as a logical continuation to the process of learning through physical or analogue models.

One of the main challenges of this strategy lies in transcending and eliminating bad practices assimilated over more than 40 years of the popularization of 2D digital vector drawing software. Despite incorporating from its first version the possibility of constructing and manipulating 3D geometry, CAD software is still known primarily as a 2D drawing tool.

Therefore, the insertion of digital media as an integral part of Architectural Design has historically represented a challenge and has confined it to the territory of two-dimensional representation and production.

Which in turn, meant a tacit disconnection with what we have called here the System of Architecture, following the theoretical guidelines of N. Luhmann. To the extent that the limited operability of CAD as a two-dimensional representation tool grew, the gap that separated it from the Systems of Architecture grew as well.

In this context, it is important to point out the value of academic forums of Architectural speculation,[4] which have contributed enormously to the exploration and expansion of the capabilities of digital tools as mechanisms of formal/spatial manipulation. Today, academic forums around the world continue to concentrate Pedagogical discussions regarding a critical stance *vis-a-vis* innovative teaching tools and methodologies.

One of the guiding interests in the incorporation of digital tools into this Methodology, is to ensure that the student's formal repertoire is as abundant as possible, as well as to generate

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[4] The paperless studios, an experiment conducted in in the mid-1990s at the Graduate School of Architecture, Planning and Preservation at Columbia University (GSAPP), is a particular example that illustrates the attention drawn by digital tools as means to expand discursive and disciplinary discussions regarding speculative experimentation with form and space.

recursive iterations as fast as possible. In order to create a clear evolution within the students′ learning process it is also important to translate the first approaches of physical models to digital interfaces in a coherent way. From this perspective, the 3ds Max software and its implicit functionality to manipulate basic solid objects offers an ideal link to achieve this purpose.

However, it is important to note that operations in 3ds Max exclusively contemplate manipulation of solids and, as we will see later, understanding the Geometric relationship between solids and surfaces is an essential notion of the Pedagogical approach of this Methodology.

It is important to remember that in Geometric terms solids are three-dimensional figures, which have length, width and height, occupy a place in space and define volume. Their faces are surfaces that can be flat, as in the case of polyhedra (cubes, pyramids) or surfaces with curvature, as in the case of solids of revolution (cylinder, cone, sphere). It is of particular importance to specify that the faces of a geometric solid enclose a finite interior space. The result of manipulating one or more of the surfaces that define a solid leave it exposed to the infinite volume of outside space.

This methodology tries to make evident the recognition of the interior space inscribed in the Form (finite), the perception of Geometric totality, its perception from the outside and its relationship with the context (infinite). This distinction seeks to highlight the interior/exterior relationship inherent to any Geometry, extending that relationship beyond its utilitarian and operational understanding (function) to also include its perceptual dimension and its contextual relationship.[5]

Because it is a software based on the creation of surfaces, Rhino becomes an essential piece within the progressive sequence of this Methodology. The level of precision and geometric rigor in its modelling processes make it the logical step after initially setting up Geometry in 3ds Max, which is a much more intuitive and flexible software.

At the same time, Rhino is a tool that efficiently incorporates the stages of development of a design project in a seamless way. First, Rhino has efficient and clear processes for extracting 2D information from a 3D digital model. Various attributes in its interface make these processes intuitive and very evident. This helps to emphasize the idea that any two-dimensional vector drawing (plans, sections, facades) is a mechanism to represent a three-dimensional object.

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[5] In this stage, the understanding and control of concepts such as finite and infinite volume is essential. So are the different mechanisms to induce its perception and the way in which Form and Space relate with the context where architecture is immersed.
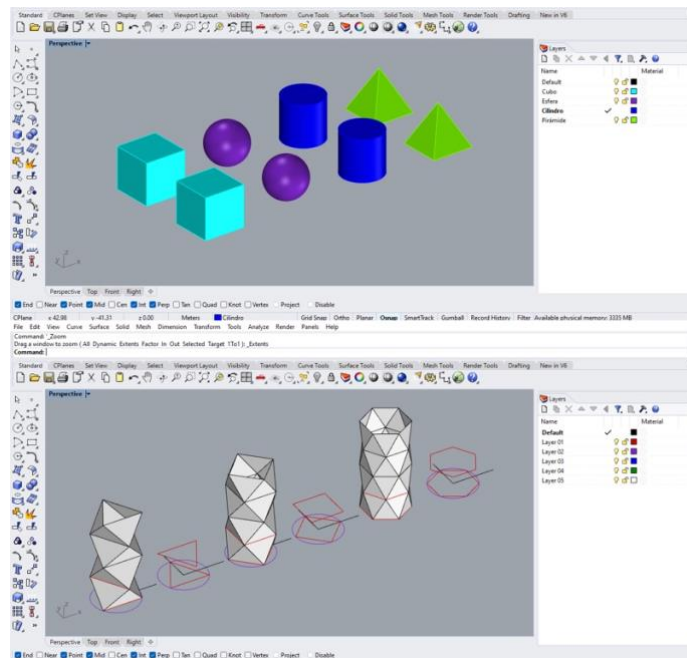
Figure 3: Rhinoceros software interface
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Furthermore, by reinforcing basic principles of Descriptive Geometry, which are the foundations on which these representation tools are based, this Methodology helps create in the student the notion of progressive knowledge, essential in his/her training as a Design professional. The feedback capacity in the modelling process implicit in Rhino makes it a particularly versatile tool. The decisions that are made as the project progresses at any time can lead to rethinking assumptions made in the initial stages of the process.

Finally, it is important to mention that Rhino has a practically unlimited capacity to operate through different units of measurement, which emphasizes in the student the idea of Design as a tool to order the material world, regardless of its scale. This means that the qualities of the tool promote the understanding of Architecture in correlation with its context. And at the same time its coexistence and interrelation with its physical, material and constructive foundation.
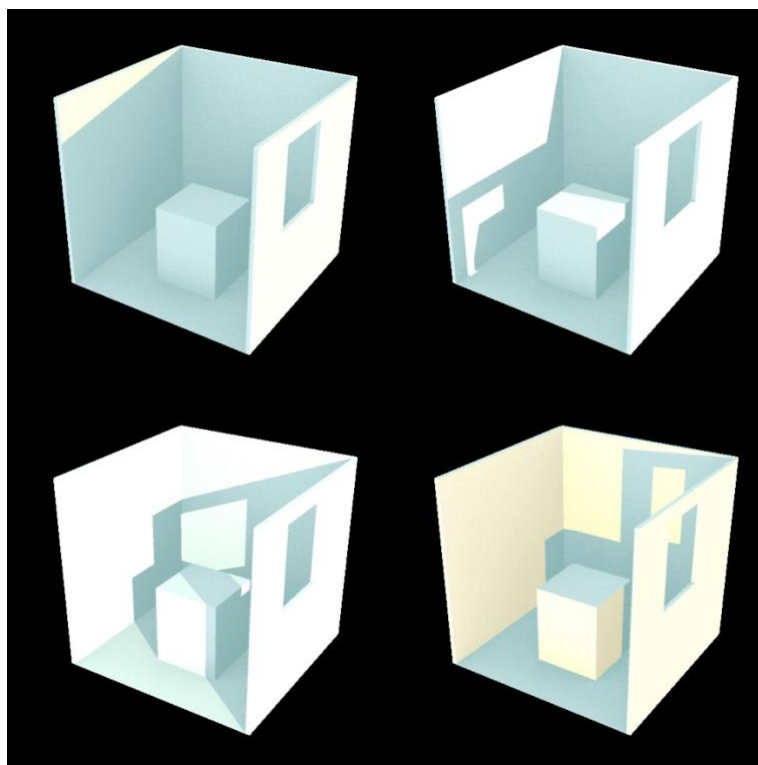
Figure 4: Geometry under a solar incidence time lapse
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Generative Artificial Intelligence

What has been described up to now is the recount of a process already taking place within the Pedagogic system of a limited number of Design Studios at the School of Habitat at the UASLP. As mentioned before, its implementation relies on the structure of the Architecture program curriculum and its courses. It has been tested with students enrolled up to the midpoint of the Instrumental stage where courses on Digital Modelling become available and thus, the Methodology reaches a limit where these tools can be applied. However, in the face of emerging digital tools that rely on a higher level of sophistication this document tries to speculate their role in key aspects that will affect Educational Methodologies in the future.

Artificial Intelligence is a reality already embedded in many aspects of contemporary life. Its most used applications so far are based on the fields of web search engines, recommendation systems or recognition of human speech. Recent breakthroughs on the core structure of its programming and the incursion into innovative neural architectures have opened up many fields previously thought unreachable to Artificial Intelligence.

Among these are the fields of the Arts and the creative (Design) disciplines. What we know today as Generative Artificial Intelligence and Computational creativity has started to create outputs showing puzzling levels of intelligence and creativity. So far, the core structure of deep learning programming for Generative AI has been made available through the platforms of three main field players: Stable Diffusion, Dall-E and Midjourney. Such is the impact of its early manifestations, that in many disciplinary forums serious discussions are taking place regarding authorship, creative validity or originality.

Leaving those really important discussions aside, we propose here to address its potential functionality within the field of Architectural Design and its insertion into the Pedagogical Methodology described previously.

Despite its initial appearance, Generative AI doesn't offer much beyond a very effective tool to generate repetition and variation. But neither difference nor *recursiveness*. Therefore, we claim that the use of Generative AI by itself is incapable of inserting itself into what we have called the System of Architecture.[6]

Nevertheless, used in a strategic and critical way, Generative AI could become an important asset along the process to generate *recursiveness*. If 3D digital tools offer an accelerated way to project, manipulate and visualize Geometry and Form, then Generative AI offers a hyper acceleration of that process.

A promising connection between the programming architecture of Generative AI and the Methodology described is the reliance of Generative AI on meaningful semantical prompts. These prompts keep an interesting relationship between query, key and value inputs at the programming level of the software.

If conduced properly these prompts could potentially draw parallels and unleash meaningful implications for keywords embodying perceptual, existential, functional or contextual requirements. And therefore, offer valuable insights into how recursive iterations of Form could respond to the complexities surrounding a project.

However, the risk of using Generative AI resides in its potential uncritical and simpleminded use. Disconnected from a proper Methodology, an analytical approach or a strategical insertion into the workflow of Architectural Design, it is easy to see Generative AI falling into the generation of irrelevant, superfluous or unnecessary visual information.

Conclusions

The main goal behind the Methodology presented here is to prioritize the use of Architectural Form at a conceptual level as the guiding strategy behind Architectural Pedagogy. The process described here, implemented across three years of practical exercises within the Design Studios of the Architectural degree at UASLP shows results where students are capable of driving Spatial, Functional, Perceptual and Existential requirements through the development of Formal typologies, manipulation of Geometric variations and improvisation of compositional iterations.

The work of Niklas Luhman is present along different stances across this Methodology. The definition of the qualities of Form or its insertion into a Social System of communication are logic and direct interpretations of his work. However, this Methodology owes a great debt to Luhman for laying the foundations of the concept of *recursiveness*. The employment of 3d digital tools as an accelerated strategy for creating *recursiveness* is a development result of this Methodology. This line of thought goes as far as claiming that the potential implementation of Generative Artificial Intelligence in Design Pedagogy could be seen as a manifestation of a hyper acceleration of *recursiveness*.

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[6] Here, it is important to remember the quote attributed to Luhman regarding the importance of difference in order to trigger significant communication and the creation of Form.

The importance and constant awareness of archives of existing configurations of Architectural Form is also a direct reference to the work of Luhman, its practical application in this Methodology is carried out through digital means on the web-based platform of Pinterest. The results presented here confirm this strategy has achieved optimal results in the students' design process.

As an integral and evolutionary piece of this process, we also present the idea that the generation of Form is a central piece in Design Pedagogy. To this end, in addition to the traditional resources of sketching and physical models, modeling on digital platforms such as Rhino or 3dMax, constitute ideal means for the creation and manipulation of Form, with an increased speed to generate automatic variations and unlimited configurations. It has also been mentioned its limited use as two-dimensional representation tools has been harmful to the advancement of these objectives.

It has also been speculated that, as Generative Artificial Intelligence becomes more advanced and its availability and use become wider spread, its potential application in this Methodology could offer great advantages. However, as with any new technology, there are also latent risks implicit. Therefore, further practical application within this Methodology is strongly suggested before claiming Generative AI an integral part of the process.

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From Analysis to Creation: Utilizing the ADDIE Model for Developing and Educational Game for Children

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Abstract

Designing educational games for children is a topic that warrants attention, particularly when using the ADDIE model as a game development framework. In this exposition, we evaluate three notable children's video games to highlight the complexities associated with designing games for children. Additionally, we present the ADDIE model, a well-known instructional design framework, to our audience to elaborate on its potential applications within the video game industry. The importance of creating educational video games for children is emphasized in this discussion. The ADDIE paradigm offers game designers a structured approach to creating educational video games that are both enjoyable and advantageous to a child's growth and education. To summarize, the process of developing a children's video game entails numerous stages and components that demand considerable effort. Game designers may employ established methodologies like the ADDIE model to create educational games that provide young children with a fun and informative experience. Games that require children to utilize their analytical and problem-solving abilities and decision-making skills can equip them with essential life skills that they can use throughout their lives. A combination of constructivist and social learning theories may be utilized to foster educational play by promoting exploration, cooperation, and reflection. Designing engaging and educational video games for children necessitates a thorough understanding of child development and various learning theories. And through the combination of theory to sort out the framework of children's video game design and detailed process.

Keywords: ADDIE Model, Children Video Game, Game Design Framework

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Introduction

The potential of digital games to promote early childhood learning and development has been increasingly clear in recent years. In response, we created a video game for children age below 7 to promote the development of early reading, numeracy, social, and emotional abilities. We discovered that the ADDIE model has significant strength in educational games through case studies and market research of popular children's games. The ADDIE paradigm, which is a proven instructional design framework encompassing a systematic approach to analysis, design, development, implementation, and assessment, was used to create our games. We conducted a thorough examination of existing children's games, investigated effective game design methodologies, and contrasted our approach to discover areas for improvement. This article describes our design and development process, as well as the methodologies we employed to assess the game's effectiveness. According to our findings, the game has the potential to improve children's early education by delivering interesting and relevant learning experiences. This study's findings have significant implications for the development of effective play-based learning practices in early childhood education.

1. Related Video Game Analysis

Explanation Video Game Classification

In the past decade especially, video games have received a growing amount of attention, and children's video games constitute a substantial portion of the gaming market (Lenhart et al., 2008). Increasing numbers of researchers are emphasizing on game-based learning and the gamification of education and training. Video games, which use electronic products as a medium, are increasingly utilized as the popularity and development of electronic products increase. Educators recognize the potential educational and developmental benefits of video games for students (Papastergiou, 2009; Rosas et al., 2003). Some parents but with a skeptical attitude to video game (Steinkuehler, 2010). The content of children's video games is deemed appropriate for their age. The educational value of children's video games deserves recognition, and most of these games are intended to educate players in fundamental cognitive-related knowledge, mathematics, science, language, or art-based games. In addition, they have the potential to foster problem-solving, critical reasoning, and social and emotional intelligence.

In addition to the educational benefits they offer, video games for children can also be a source of amusement that is both enjoyable and interesting. After a hard day at school, they can help children relax, and they offer a healthy outlet for youngsters to use to deal with stress and worry. However, parents are responsible for keeping a close eye on their children's use of video games and ensuring that the games their children play are suitable for their age and current level of development. They should also limit the amount of time spent in front of screens and encourage alternative types of play as well as physical activity. Children's video games have the potential to be an educational and developmental asset if they are played appropriately and in moderation.

The categorization of video games into various genres has been a significant aspect of game design and development. As a result, game categories have emerged based on common themes and mechanics. These categories have unique characteristics and are often associated with specific types of games. Adventure games, for instance, involve exploration, puzzle-solving, and storytelling, while sports games simulate real-world sports and allow players to control individuals or teams. In addition to these genres, there are also several classifications of educational games, depending on their educational scope (Breuer & Bente, 2010). Subject-

specific games are designed to teach specific subjects, such as math, science, or language arts. On the other hand, cognitive skills games aim to improve cognitive skills like memory, attention, and problem-solving. Social and emotional learning games are designed to teach social and emotional skills, such as empathy, self-awareness, and conflict resolution. Serious games, which aim to have a real-world impact, can teach players about social issues or train them for specific jobs. Furthermore, augmented, and virtual reality games use immersive technology to create engaging learning experiences.

The classification of educational games is crucial to their design and intended learning outcomes. This categorization ensures that games are not only engaging and fun for children but also educational and aligned with specific learning objectives. Moreover, game developers and educators must ensure that the design of these games is based on sound pedagogical principles, such as scaffolding and social learning theory, to facilitate effective learning. By considering these aspects, developers can create effective and impactful educational games for children.

The Influence of Genres of Theory on Educational Games

Video game design and production have been heavily influenced by several theoretical genres. To encourage desirable player behaviors and discourage undesirable ones, behaviorist principles from the field of psychology have been incorporated into game design. In video games, players are often rewarded for successfully completing missions and punished for failing to do so. Games that encourage players to experiment, investigate, and discover novel solutions to issues have been designed using constructivism, a learning philosophy that places a premium on active learning and problem-solving.

According to social learning theory, people pick up new skills by emulating the actions of those they see and trust. Games that promote cooperative play and player-to-player instruction are a common application of social learning theory in the video game industry. For instance, in a multiplayer game, players may need to work together to accomplish a common goal, or the game may have leaderboards and other social elements that foster friendly competition amongst players. According to the hypothesis of cognitive load, the human brain can only take in so much information before it becomes overwhelmed. Cognitive load is frequently employed in game design to strike a balance between difficulty and immersion.

A game could, for instance, start off easy and get progressively harder as the player makes progress. Video games may be a fun and effective learning tool for kids if they use social learning theory and employ scaffolded lesson plans. Motive and interest in learning can be boosted by using video games because of its ability to provide instantaneous feedback, individualization of content, and opportunity for mastery. Furthermore, video games can offer a risk-free setting where kids can hone their interpersonal and problem-solving abilities including communication and teamwork. Social learning theory and scaffolded teaching sessions in video games have the potential to be useful educational tools that can help kids learn and grow.

Comprehensive Review of Children Video Games

To create a suitable video game, several critical criteria must be considered. The game's content—storyline, characters, and themes—should be assessed (Clarke et al., 2017). At the same time, the game should be enjoyable and informative without violent or upsetting elements

that might be damaging to children (Kirsh, 2011). The game's mechanics and gameplay should be enjoyable and challenging for children, promoting skill-building and learning (Kulman et al., 2014). Furthermore, the game's visuals and music must be entertaining for young players. Parents and educators can assist children select educational games by using a complete game review method.

A game that focuses solely on remembering and comprehending objectives may not require players to apply or analyze the acquired knowledge (Arnab et al., 2015). Conversely, a game that concentrates solely on higher-level objectives, such as evaluation and creation, may not provide the necessary foundational knowledge to support these higher-level skills (Carvalho et al., 2015). By integrating the objectives of each level of Bloom's Taxonomy, educational video games can provide a comprehensive learning experience that promotes critical thinking and foundational knowledge (Forehand, 2010). In addition, by integrating educational objectives with Bloom's Taxonomy, game designers and educators can assess student learning more accurately and modify instruction as necessary. Bloom's taxonomy of objectives is a well-established educational framework that divides learning objectives into six levels: remembering, understanding, applying, analyzing, and evaluating. The taxonomy provides a clear and systematic method for organizing educational objectives, making it simpler for educators to plan instruction and evaluate student learning. Czauderna and Guardiola (2019) by using the Bloom Taxonomy to classify the objectives of educational video games, game designers and educators can ensure that the games provide a well-rounded learning experience.

This research chose three games for children aged 3-6 years old that are now accessible on the iOS Online App Marketplace as well as the Google Online App Marketplace. The categories are shown in Table 1. These games were given the names X, Y, and Z. The selection process was based on Bloom's goals. In only one nation, X has 8.54 million downloads, but Y has just 2.76 million downloads (Marko Dimitrievski, 2023). It is generally agreed that the Z game is now the video game that has the greatest level of popularity.

Table 1. Classification of Three Types of Video Game Content

	Adventure	Role play	Sports	Simulation	Construction
Remembering		X, Y, Z			X, Y, Z
Understanding	Y, Z		X	X, Y, Z	
Applying	X			Y,	Z
Analyzing	X, Y		X		X, Z
Evaluating					
Creating	Y			Y,	X, Z

These categories are not mutually exclusive, and many instructional games may fall under more than one. The educational games in this study are classified based on their design and process. A careful classification can reveal the distinguishing characteristics and traits that make them useful teaching tools. Understanding the entire process of educational games allows us to better examine their impact and potential to give children with meaningful learning experiences.

Other types of educational games are classified according to their instructional scope. Subject-specific games, cognitive skill-based games, social and emotional learning games, serious games, and augmented reality and virtual games are all examples of educational games. As shown in Table 2. These classifications will be compared and summarized using Bloom's educational aims as a foundation.

Table 2. Classification of Three Types of Children Video Game Themes

	Domain-specific	Cognitive skills	Social Emotion	Serious Games	Augmented and virtual reality
Remembering				Y	
Understanding	Y, Z	X, Y			Z
Applying			X, Z	Y	
Analyzing	Y	X, Y			
Evaluating		Z			
Creating	X				

While there are educational children's video games that focus on cognitive skill development, it is difficult to locate games that handle numerous issues holistically through analysis. However, via play, these games can significantly improve children's skills and support social-emotional development, as well as aid in the learning and consolidation of subject-specific knowledge. Thus, designing and developing educational and engaging video games for children is a hard but necessary undertaking that demands careful consideration of the target population and their learning needs.

In video games, Kapp (2012) has identified several essential components. These components consist of objectives, rules, conflict, competition, and cooperation, reward structures, feedback, hierarchical narrative, interest curves, aesthetics, and repetitive gameplay. Each of these components contributes significantly to the overall experience of a video game. Goals provide participants with a distinct sense of purpose and direction and motivate them to actively participate in the game (Hoffman & Nadelson, 2010). The rules establish the parameters within which participants must operate, laying the groundwork for conflict and competition to develop (Stenros, 2017). In turn, conflict generates tension and excitement, driving participants to compete against one another or collaborate to achieve a common objective (Barnett & Coulson, 2010). Reward structures and feedback help reinforce positive behavior and encourage players to continue playing, while levelled storytelling and interest curves maintain player engagement by providing a sense of progression and difficulty. Aesthetics are also essential because they contribute to the creation of a world that players want to explore (Kim & Lee, 2015). Repetition is essential to the success of video games because it enables players to hone their abilities and grasp the game's mechanics over time. Game designers can create engaging, challenging, and rewarding experiences for players of all ages and abilities by incorporating these various elements into their designs.

2. Applying the ADDIE Model for Effective Game Development

2.1 ADDIE Model

The ADDIE model is frequently used in instructional design and game development to ensure that the final product effectively meets the intended learning objectives. Analysis, Design, Development, Implementation, and Evaluation are the five phases of the ADDIE model, which provides a systematic approach to the design and development process (Davis, 2013; Muruganantham, 2015). Using this model, game designers can guarantee that the game is well-structured, meets the learning objectives, and is engaging for the target audience. The Figure 1. shows the ADDIE model's five phases: Analysis, Design, Development, Implementation, and Evaluation. Each phase of the ADDIE paradigm is crucial to game development success. Analyse the target audience, learning objectives, and needs. Design entails generating the game concept, mechanics, and a prototype. Game development includes programming, graphic design, and audio production. Implementation includes game launch, testing, and distribution. Finally, the Evaluation step evaluates the game's learning objectives and makes modifications depending on input. The ADDIE paradigm ensures that all aspects of game development are studied and addressed. It lets developers tweak and improve the game during development.
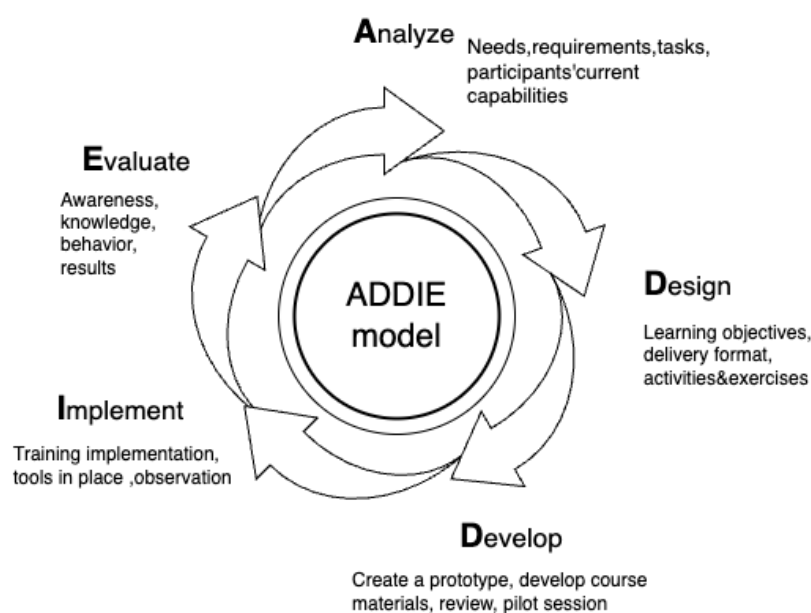
Figure 1: The ADDIE Model

The previous framework MDA (Mechanics, Dynamics, Aesthetics) was designed to analyse games, not necessarily to create them (Kim, 2015). These frameworks do not address specific aspects of game design beyond gameplay, they do not include telling a specific narrative, and they do not include having a completed story line, which emphasises the interplay between the game's laws (mechanics), the player's experience of playing the game (dynamics), and the player's overall emotional response (aesthetics). Another common game design paradigm is the LGD (Lean Game Design) framework, which emphasises quick iteration and feedback to develop a minimal viable product (MVP) before expanding the game (Coleman et al., 2014; Hyrynsalmi et al., 2018). Other models include the design thinking method and the human-centered design approach (Deterding et al., 2011).

As illustrated in Figure 2., the ADDIE paradigm provides a systematic and structured approach to game development. This enables the unambiguous identification of goals and objectives. Provides a framework for team members to collaborate. Assists in ensuring that all components of the game are carefully planned and developed. Allows for more accurate evaluation and assessment of project progress.
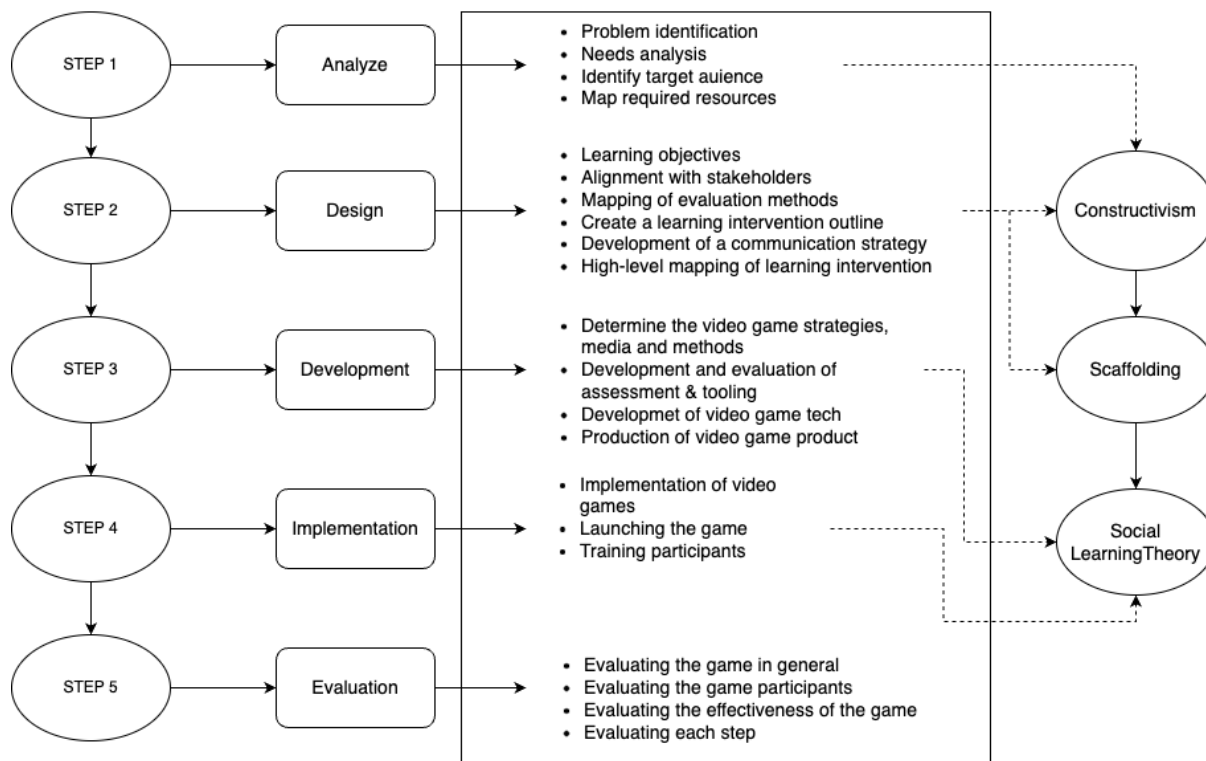
Figure 2: The ADDIE Paradigm

Each step of the game design can be identified through the approach and methodology research design, as shown in the overall flow diagram in Figure 2. Explain how the ADDIE model can be carried out at each stage of video game design. and how theory can support video game design. Constructivism can be applied to all stages of game creation as defined by the ADDIE model, although it is essential during the Analysis and creation stages. Game designers can identify the skills and knowledge that players need to gain during Analysis, and they can create learning experiences that enable players to construct their understanding of the subject during Design. In the ADDIE-structured game design development phase, scaffolding theory plays a role. During this stage, game designers build learning experiences that steadily increase in difficulty while giving support and advice to assist players in acquiring and mastering new skills. Social learning theory can be applied to several stages of ADDIE-framed game design, most notably the Development and Implementation stages. Game designers can construct multiplayer games that enable players to interact and learn from one another during development. Through online forums and social media, game designers can give opportunities for players to share their experiences and learn from one another during implementation.

2.2 ADDIE Model in Game Design Process

The ADDIE model is a methodical approach that ensures that the game is built with a clear goal in mind and that it satisfies the intended audience's needs. Braad et al. (2016) study in

game design and found the ADDIE model is critical in the game development process since it provides an organized approach to game creation. It aids in the identification of learning objectives, target audiences, and game mechanics to meet the objectives. The methodology also ensures that the game's design is based on research-based best practices for learning and engagement. Using the ADDIE paradigm, game designers can construct effective and interesting games that meet their targeted learning goals. Figure 3. illustrates the ADDIE model's connections throughout the game design process.
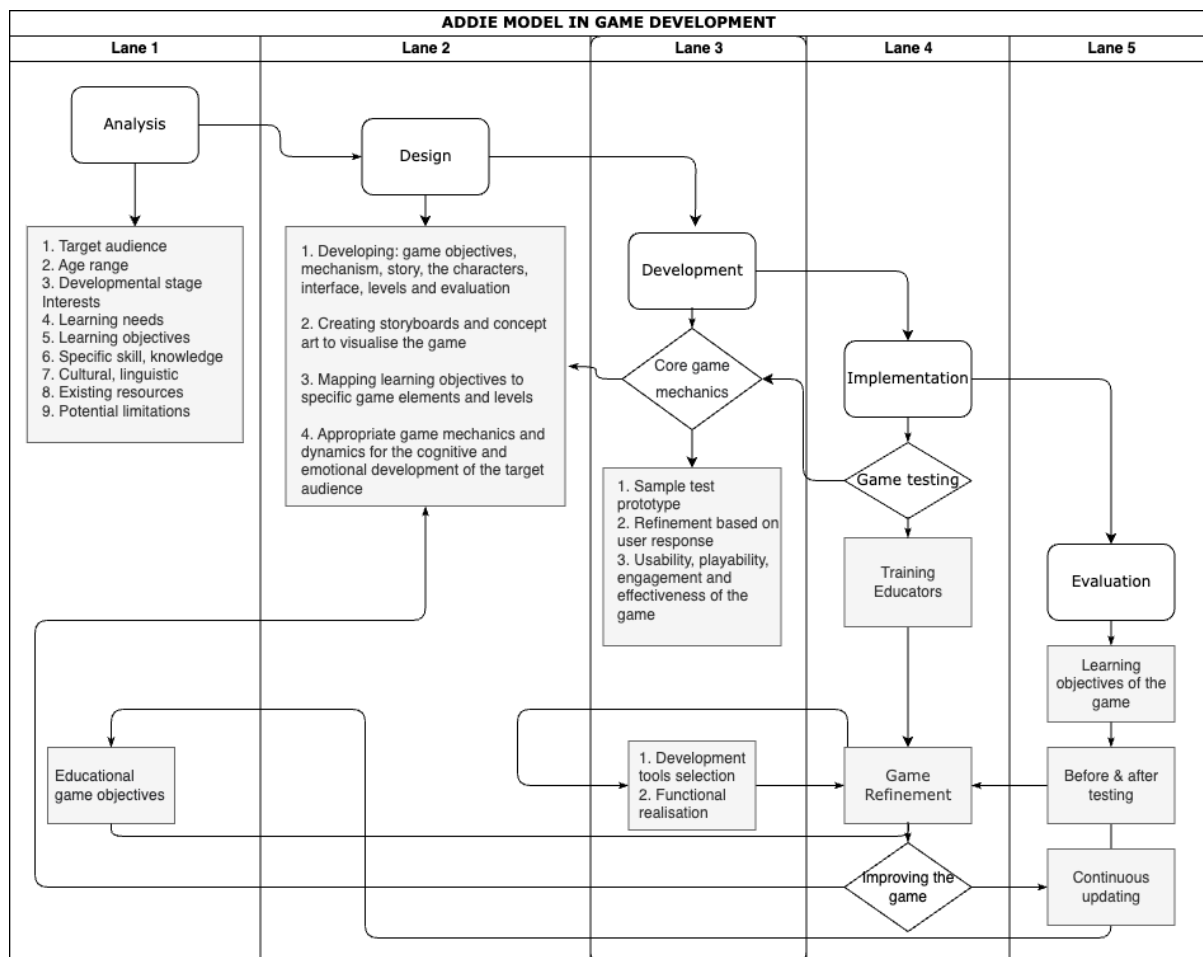
Figure 3: The ADDIE Game Design Process

A box represents each step in the process, and the arrows indicate the flow of the process from one step to the next. The game designer will evaluate the game's intended players and any pedagogical or educational aims that must be met. The game designer then draws out a plan for the game, complete with all the features discovered in the analysis stage. The development process for a video game starts when its blueprint has been finalized. The development stage is where the game's code and mechanics are written and refined. All the game's mechanics and difficulty settings are fine-tuned and tested for any remaining issues during this phase. The ADDIE methodology culminates in an assessment phase in which the designer determines whether the game was successful in teaching the intended lessons. The ADDIE model is a useful framework for makers of educational games who want to maximize its impact.

Conclusion

Educational games can be a fun and efficient method for children to learn essential concepts and abilities. By employing the ADDIE model to the game development process, designers can ensure that the game is created with clear learning objectives in mind and that its content, mechanics, and activities are aligned with these objectives (Kapp, 2012; Lim et al., 2013). We saw the possibilities of applying the ADDIE model to drive the game production process, as well as analyzing how different design frameworks such as constructivism and scaffolding might be utilized to improve learning results, after analyzing three instances of educational games. The study emphasizes the relevance and breadth of designing educational games with children's specific needs and features in mind, as well as ensuring that games match educational objectives and learning results. The ramifications of this study extend to game creators and educators, as successful deployment of educational games can improve learning quality and classroom engagement. Finally, the development of educational games for children has considerable promise for boosting learning quality and classroom engagement. Developers can create learning games that are both interesting and effective by utilizing design frameworks such as the ADDIE model, constructivism, and scaffolding.

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How Does Adult Learners' L1 Interact With Word Frequency in the Error Rates and Patterns of L2 Classifier Use: A Cross-Linguistic Comparison

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Abstract

Previous literature has reported mixed findings on the effect of L1 (classifier languages vs non-classifier languages) on the acquisition of L2 classifiers. This study aims to investigate whether any effect of L1 may be modulated by the word frequency of the target classifiers. Chinese classifiers were categorized into pre-established frequency bands A to C in descending order of word frequency, and learner data was extracted from the HSK Dynamic Composition Corpus containing sentences with classifiers written by L1-Korean and L1-English learners, with a total of 5248 sentences analyzed. Two native Mandarin speakers reported the error rates, and errors were also further categorized into four different types (i.e. misuse, omission, overuse, misorder) to investigate any differences in error patterns across different L1 groups. Results showed a significant interaction between L1 and classifier word frequency, with comparably low error rates for both L1 groups on high-frequency classifiers, but a significantly higher error rate for L1-Korean learners on low-frequency classifiers. Aligned with exemplar theory, more frequently encountered classifiers may have a relatively robust representation in the mental lexicon for both L1 groups, as opposed to the less stable representation for less-frequently encountered classifiers which are more prone to transfer effects from L1 to L2.

Keywords: Classifier, Word Frequency, L2 Acquisition, Cross-Linguistic Comparison

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Introduction

Previous literature has reported mixed findings on the effect of L1 (classifier languages vs non-classifier languages) on the acquisition of L2 classifiers. This study aims to investigate whether any effect of L1 may be modulated by the word frequency of the target classifiers.

Classifiers can be defined as "morphemes that classify and quantify nouns according to semantic criteria" (Senft, 2000). They are common in East Asian languages such as Mandarin Chinese, Japanese, and Korean, but are absent in most European languages. One example of a Mandarin classifier is *tiao2*, a mandatory grammatical unit between a number/determiner and a head noun that describes the noun as being a thin one-dimensional object (e.g. *yi4 tiao2 xian4 [a-CL-line]*). Another noteworthy classifier in Mandarin Chinese is *ge4*, a generic classifier that can be used with 40% of common nouns and which is often overused by both L1 and L2 speakers of Chinese (e.g. Zhang, 2007).

L1 Effects on the Acquisition of L2 Classifiers

An early hypothesis was that L1-speakers of a classifier language (e.g. Japanese, Korean) may learn L2 classifiers better than those of a non-classifier language (e.g. most European languages) by means of positive transfer. However, studies yielded mixed findings (e.g. Polio, 1994; Paul & Grüter, 2016). For example, Polio (1994) tested the use of Chinese classifiers by L1-English and L1-Japanese intermediate learners of Chinese. In their study, production data was elicited where participants narrated a story after watching the Pear Film. Results showed that although both groups of learners did not avoid using classifiers generally, no L1 effect was found.

Later studies have found that the existence of an L1 effect might depend on additional factors, such as learner proficiency of the target language and the actual linguistic task used. In terms of proficiency, Liang (2008) tested L1-English vs L1-Korean learners' use of eight Chinese shape classifiers on an object-classifier mapping task (e.g. *tiao2* for a one-dimensional object, *zhang1* for a two-dimensional object) across three proficiency levels (i.e. advanced, intermediate, beginner), and found that both Korean and English groups performed similarly at the beginner and advanced level, and a group difference was found only for the intermediate level, suggesting that any effect of L1 might be sensitive to where the learners are on their developmental path of L2 acquisition. In terms of task, Zhang & Gnevsheva (2022) compared L1-Japanese learners (classifier language) against L1-English and L1-Arabic learners (non-classifier languages) at the intermediate level, using three written tasks based around a description of the same picture – short composition, free-cloze, and multiple-choice cloze. The short composition was aimed at capturing naturalistic use of classifiers, while the two cloze tests captured compulsory application of classifiers in a more constrained manner. Results showed that L1-Arabic learners performed significantly worse than L1-Japanese learners only in the free-cloze test but not the composition task, suggesting that the effect of L1 might be sensitive to the actual task used for testing, and that learners might have used test-taking strategies (e.g. avoiding use of difficult classifiers) in certain tasks (e.g. composition) that led to an inflation of accuracy score. Both of the above results advanced our understanding that the effect of L1 (classifier vs non-classifier language) might be modulated by previously under-examined factors.

Importantly, Zhang & Gnevsheva (2022) also tested a hypothesis as to whether the types of classifiers themselves might modulate the effect of L1. Based on a typology by Gao and Malt

(2009), classifiers were categorized based on association with their head nouns – shape, animate, inanimate, and concept. For example, animate classifiers categorize animate nouns according to size and shape, and inanimate classifiers categorize inanimate nouns according to their function. Although results did not reach significance, a numerical trend was found where L1-English and L1-Arabic speakers performed disproportionately worse on concept classifiers than other types of classifiers.

Frequency Effects, and an Exemplar Account of Lexical Acquisition

As far as classifier type – as well as its potential interaction with L1 – is concerned, we put forward the hypothesis that the *word frequency* of the classifiers could be a potential interacting factor instead. At least two pieces of evidence may substantiate this claim. First is the observation that the typology of classifiers (based on association with head nouns) might be confounded with word frequency. For example, concept classifiers such as *cheng2* (associated with the concept of probability; e.g. *yi4 cheng2 sheng4 suan4 [1-CL-probability of winning]* often occupy the low frequency bands of Chinese word usage, in a classification of Chinese word/character frequency data officially published by the Ministry of Education of the People's Republic of China (Hanban, 2001).

Second, the construct of word frequency is closely tied to the exemplar theory of language processing that has become increasingly influential over the past two decades (Ambridge, 2020). The exemplar theory was proposed in response to the inadequacies of traditional abstractionist models that dominated the field in the 20th century, and has received support from fields encompassing phonological, lexical, and syntactic processing. It posits that instead of abstracting basic phonological/lexical/phonological units, learners store all instances of linguistic exposure in their episodic memory which subsequently alter their own usage of different sounds/words/grammatic structures. For example, listeners may not just abstract stable phonological word forms in the mental lexicon because recently heard exemplars will alter their own production and usage (Pierrehumbert, 2001). Crucially, in lexical acquisition, it has been found that novel words that are phonological neighbors of high-frequency words (i.e. more exemplars) were accessed faster than novel words that are neighbors of low-frequency words (Vitevitch et al., 2014). One possibility proposed by the authors of that study was that neighbors of high-frequency words have more exemplars to "latch on" to in memory. It is thus reasonable to assume that high-frequency words have a more stable representation in the lexicon *by means of* all the exemplars stored in memory.

Thus, for our current study, we suspect that L1 effects on the acquisition of Chinese classifiers might be similarly modulated by the word frequency of target classifiers, as high-frequency classifiers have a more stable representation across learners of different L1s and may have a low error rate that is comparable across L1 groups, while the representations for low-frequency classifiers are more transient and an L1 group difference may emerge.

Methods

Chinese classifiers were categorized into pre-established frequency bands A to C in descending order of word frequency, following the official statistics published under the Ministry of Education of the People's Republic of China (Hanban, 2001). This resulted in a total of 49 Band A classifiers, 42 Band B classifiers, and 20 Band C classifiers. Example classifiers for each Band are listed in Table 1 below.

Band A	Band B	Band C
ben3[本]	*zhu1* [株]	*juan3* [卷]
feng1[封]	*shou3* [首]	*ding3* [顶]
tiao2[条]	*fen4* [份]	*zhan3* [盏]
zhang1[张]	*duo3* [朵]	*xiang1* [箱]
zhi1[支]	*bu4* [部]	*cheng2* [成]

Table 1: Example classifiers from each frequency band

Learner data was extracted from the HSK Dynamic Composition Corpus which contains over 10,000 HSK composition papers of foreign exam takers. We extracted sentences with classifiers written by L1-Korean and L1-English (aggregate data from US, UK, Australia, Canada) learners. Because of the special status of *ge4* as a generic classifier that can be associated with over 40% common nouns and tends to be overused even by L1-Chinese speakers, we opted to omit *ge4* in our search.

Two native Mandarin speakers reported the error rates. Accuracy was binary-coded (1 for correct, 0 for incorrect). A sentence was considered to have a classifier error if it conformed to one of four conditions: 1. Misuse, where an incorrect classifier was substituted for the correct one; 2. Omission, where a classifier was omitted when it was required in the sentence; 3. Overuse, where a classifier was added when it should not; 4. Misorder, where a correct classifier was used but placed in the wrong position in the phrase. Results yielded an 85% inter-rater reliability. Only target sentences for which the raters agreed on the error status were included in subsequent analysis. This yielded a total of 5248 target sentences.

Results and Discussion

Figure 1 shows the overall group results. General observations reveal comparable error rates for L1-English and L1-Korean learners on high-frequency classifiers, but perhaps unexpectedly, a *higher* error rate for L1-Korean learners than L1-English learners on low-frequency classifiers.
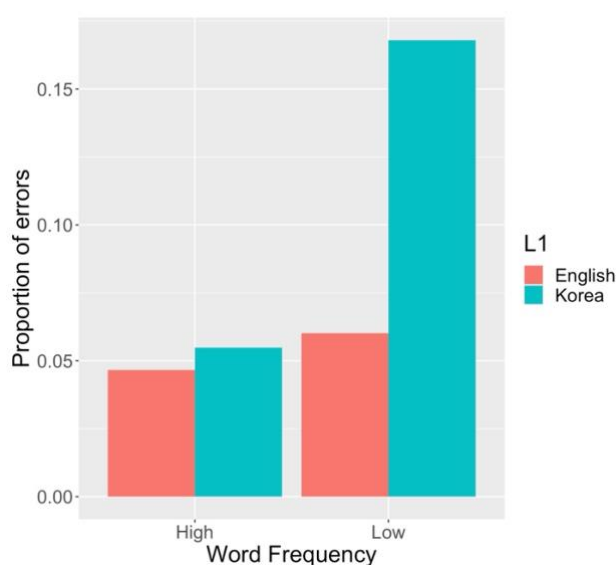
Figure 1: Proportion of overall classifier errors by L1-English and L1-Korean learners

A 2 (L1: Korean vs English) x 2 (Frequency: High vs Low) ANOVA conducted on the error rates confirmed this trend. We found a significant main effect of L1 [$F(1,5244) = 6.62$, $p = .01$], with L1-Korean learners making more errors than L1-English learners. Expectedly, we also found a significant main effect of frequency [$F(1,5244) = 98.12$, $p < .001$], with more errors on low-frequency classifiers than high-frequency classifiers. Crucially, the interaction between L1 and Frequency was significant [$F(1,5244) = 14.66$, $p < .001$], suggesting that the L1 effect was different for high-frequency vs low-frequency classifiers. Separate analyses showed an L1 effect for low-frequency classifiers only [$t(285.1) = -4.24$, $p < .001$] and not for high-frequency classifiers [$t(871.5) = -0.89$, $p = .375$], with L1-Korean learners performing *worse* than L1-English learners on low-frequency classifiers.
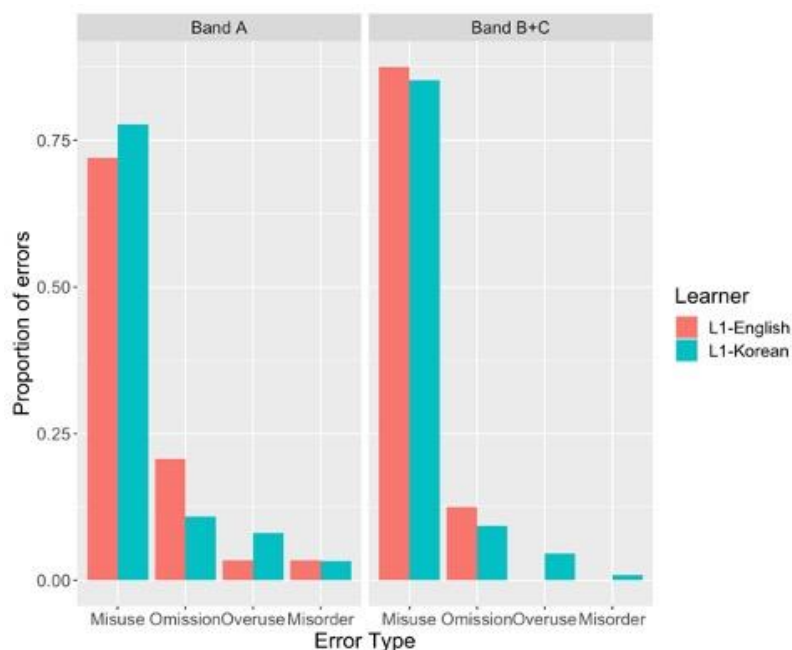
Figure 2: Classifier error patterns for L1-English and L1-Korean speakers

Figure 2 further broke down the errors into the four error types (i.e. misuse, omission, overuse, misorder). Results seem to reveal a slight tendency to *omit* classifiers for L1-English learners, as opposed to a tendency to *overuse* classifiers for L1-Korean learners.

Overall, the results confirm our prediction that word frequency of classifiers plays a role in modulating the effect of L1 (classifier vs non-classifier language) in the acquisition of L2 classifiers. In particular, both L1 groups maintained a relatively low and comparable error rate for high-frequency classifiers, suggesting that the high-frequency classifiers may have occupied a more stable representation in the mental lexicon of both L1 groups and are more resilient to errors. For low-frequency classifiers, somewhat unexpectedly, L1-Korean learners performed worse than L1-English learners. This means that the interaction could *not* result from a positive transfer for L1-Korean learners and they did not manage to leverage existing knowledge about classifiers to acquire L2 classifiers that are less frequently encountered and thus may have a less robust representation. One possibility is that perhaps due to a lack of classifiers in their L1 inventory, L1-English learners might be more cautious in applying them in written sentences (indeed, we found a smaller number of sentences in L1-English data than L1-Korean data), while L1-Korean learners may be free from this constraint given the familiarity of classifiers in their L1 system, using them even erroneously. A second possibility, as revealed in Figure 2, is that the transfer from L1-Korean classifier system to

L1-Chinese classifier system may not be always positive. Since Figure 2 shows a tendency of L1-Korean learners to overuse classifiers, it may be the case that the L1-Korean learners have erroneously used classifiers that are present in Korean but not in Chinese.

Conclusion

The present study showed that an L1 effect (classifier language vs non-classifier language) exists for the acquisition of L2 classifiers, but is modulated by the word frequency of the target classifiers, with an L1 group difference emerging for low-frequency classifiers only. While the present study proposed explanations for the counter-intuitive trend of L1-Korean learners performing worse than L1-English speakers in terms of constraints of usage, or specific error patterns like overuse of L2 classifiers, further empirical research is needed to compare different classifier-L1s (e.g. L1-Japanese vs L1-Korean) in the acquisition of L2-classifiers across different word frequencies in order to confirm whether the transfer effects are universal to classifier languages or specific to Korean.

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Designing Teaching Materials in the On-Demand Classroom Within the Context of Thailand Lesson Study Incorporated With Open Approach: TLSOA

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Abstract
This study aimed to explore how to design teaching materials for the On-Demand Classroom within the context of the Thailand Lesson Study incorporated with Open Approach. Employing a qualitative research methodology, this research involved thirty-one elementary school students and a lesson study team comprising mathematics teachers, researchers, and mathematics and art educators. Data collected from the process of the Thailand Lesson Study incorporated with Open Approach – Collaboratively Plan, Do, and See. Besides these processes, Blended Learning Classrooms, On-Demand Classroom, and Virtual Live Classrooms have been employed. The results revealed that during the collaborative planning process, the LS team designed teaching materials for the On-Demand Classroom, including an on-demand video containing a problem situation, introducing the materials and detailed box assembly instructions, worksheets, and clear guidelines for work submission. Besides, the Problem Situation in the ODC video was meticulously crafted in alignment with 1) Context, which overlaps with the student's experiences and is essential to coping with and engaging Problem Situation, in this study where the box exists daily. 2) Condition, which is the various forms of instruction that play a critical role in supporting students to connect with the PS to cultivate self-learning, students must create a box and unravel it or create it themselves.

Keywords: Teaching Material, On-Demand Classroom, Thailand Lesson Study Incorporated With Open Approach

Introduction

The COVID-19 pandemic has disrupted education worldwide, leading to the closure of educational and other institutions. Many countries have adopted distance communication to address this, yet most countries encounter obstacles like insufficient infrastructure and limited access to computers and the Internet (Tadesse & Muluye, 2020). In Thailand, the sudden closure of educational institutions raised concerns about the continuity of learning for students at all levels. It was a crucial measure implemented to prevent the outbreak's spreading (Ministry of Education, 2022). While this process was essential for public health, it also brought significant challenges and disruptions to the education sector. The abrupt shift from face-to-face classroom learning to remote learning posed challenges for students, teachers, and parents alike. Notably, the transition to online learning highlighted existing disparities in access to technology and internet connectivity among students, particularly in rural and underserved areas (World Bank, 2021).

Even though learning has changed to distance learning, the ways to approach it are not as effective as studying in an actual classroom setting. This led to the challenge of student learning; some could not reach distance learning because of their economic affordance, staying home for a long time, affecting student learning efficiency, etc. Most educators and stakeholders seek to address this challenge.

However, in addressing this challenge, there is the impracticality of exclusive points out it was not practical to choose solely between online or on-site learning (Ohara, 2020). Notably, Inprasitha (2021; 2023) underscores the importance of effective blended learning, emphasizing the delicate balance between students' self-study time and their interactions with teachers and peers, and proposes the Blended Learning Classroom (BLC) as a teaching approach to address this challenge to improve students' self-regulated learning experiences and engagement by utilizing the Thailand Lesson Study incorporated with Open Approach (TLSOA) model (Inprasitha, 2006; 2011; 2022). As in the BLC model, the on-demand classroom, which contains problem situations in video format, is a critical component that allows students to engage in self-directed learning at their convenience (Inprasitha, 2023a). The problem situation, as designed in the video, plays a critical role in guiding students' self-directed learning and cultivating their ability to formulate and address their problems (Isoda & Katagiri, 2012). Understanding how to design problem situations within the ODC is a central focus of this study. Thus, this research aimed to explore how to design teaching materials in the On-Demand Classroom (ODC) within the context of TLSOA.

Teaching Material

Teaching Material is a meticulously designed lesson plan centered on designing problem situations derived from textbook translation projects of the Center for Research in Mathematics Education (CRME). Prioritizing problem-solving aims to foster the development of student's critical thinking skills by providing them with opportunities for independent thought. Aligned with Inprasitha (2016), a problem situation consists of two crucial components: context and condition. (1) Context: the segment intersecting with learners' direct experiences emerged as a meaningful anchor, particularly when students grappled with tasks, assignments, or problem situations. (2) Conditions: Encapsulated in concise instructions with "keywords," they played a pivotal role in accessing students' conceptualizations, enhancing their ability to navigate and effectively engage with future problems.

Thailand Lesson Study Incorporated With Open Approach (TLSOA)

TLSOA is an implementation model that integrates the Open Approach, a teaching approach for teaching mathematics problem-solving, with Lesson Study processes, and this model serves as a guideline for the school-based professional development of teachers (Inprasitha, 2015; 2022) (Figure 1).

Lesson Study refers to a process/approach that is focused on collaboration among teachers to improve their own and their peers' teaching practices through a constructed cycle to enhance and develop teachers' learning process and professional growth, directly impacting student learning development it consists of three steps as follows (Inprasitha, 2006; 2016; 2022). (1) Collaboratively Plan (Plan): The lesson study team designs the lesson plan and its critical components, such as problem situations (Inprasitha, 2016; 2019), designing teaching material, anticipating students' problem-solving and difficulties toward designed problem situations, and other necessary. (2) Collaboratively Do (Do): one of the lesson study teams implements the planned lesson from Step (1) with the OA as a teaching approach (Inprasitha, 2011; 2015; 2022), and the rest of the members observe the learning activities, prioritizing students' learning process. (3) Collaboratively See (See): conducted once a week as a weekly cycle to discuss the process that they have done during steps (1) and (2), such as the student learning process, the objective(s) of the lesson, the anticipated ideas, and the ideas that take place during step (2), the design of teaching material, etc. (Inprasitha, 2011, 2022). This step makes the TLSOA distinct from other models that, rather than immediately post-lesson as practiced in the Japanese Lesson Study and other countries, focus intensively on the details of the quality of the lesson itself as Inprasitha (2023b).
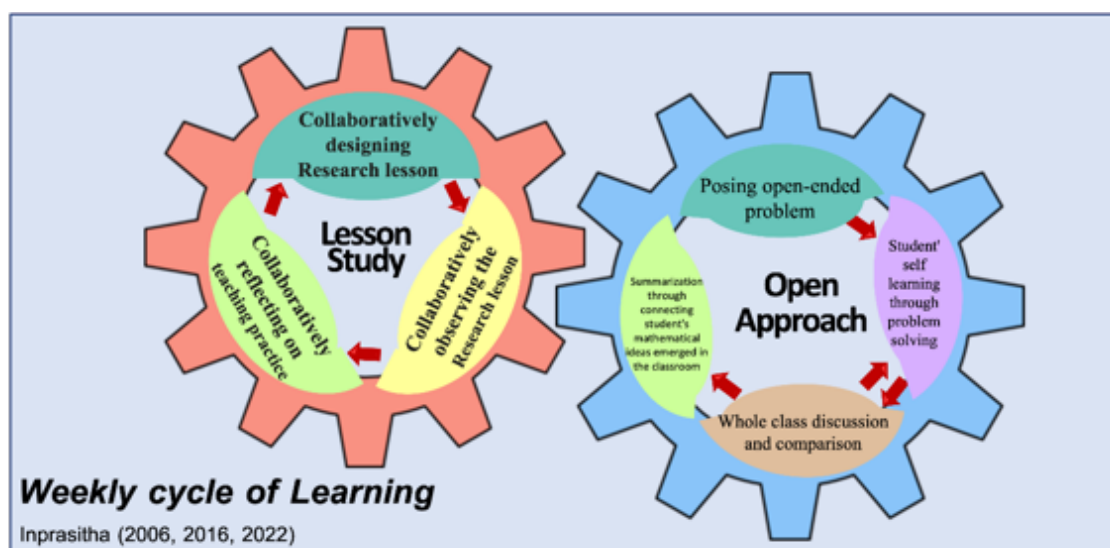
Figure 1: Weekly cycle of Learning based on the concept of Inprasitha (2006, 2016, 2022)

The Open Approach is a teaching approach that emphasizes problem-solving and utilizing open-ended problem situations to encourage students to pose and solve their problems. It is more centered on process-oriented outcomes. As well as emphasizing the student learning process, this approach consists of four steps (Inprasitha, 2006; 2011; 2022):

(1) Posing open-ended problems: teachers propose the problem situation with the foundation of problem posing and solving, and students are motivated in problem situations and take a problem to themselves (Problematics).

(2) Students' self-learning: students will individually/group solve the problem and later share every single thought in the group to come up with the group ideas, and the teacher will turn his/her role to observing students' problem-solving and jotting down their ideas – similar to the idea of Kikan- shido or the between desk instruction.

(3) Whole-class discussion: students present their ideas to the whole class, and in this process, students ask questions to the presenter and discuss the idea together the responsibility of the teacher during this step is to guide mathematical discussions following each student's solution or ideas presentation.

(4) Comparison and summarizing by connecting students' mathematical ideas: from step (3), teachers and students collaboratively compare and summarize each idea or solution to develop the class ideas and learn "how to" learn.

On-Demand Classroom (ODC)

The On-Demand Classroom (ODC) is a crucial component within the Blended Learning Classroom (BLC) model (Inprasitha, 2021; 2023a), as shown in Figure 2. In this approach, the ODC focuses on fostering informal learning, where students independently engage with educational content based on the context and conditions of tasks or problem situations provided by their teachers. Unlike traditional classrooms, ODC does not require students to schedule appointments with their teachers, enabling them to manage their learning time independently.

Within the BLC model, which also includes the Visual/Virtual Live Classroom (VLC) and the Face-to-Face Classroom (FFC), the ODC stands out as a platform for self-directed learning. Students are encouraged to navigate their learning journey without fixed timelines, allowing flexibility and adaptability. This emphasis on independence aims to empower students to take control of their education, aligning with the broader goals of the BLC model.

The ODC, as part of the BLC model, plays a crucial role in the paradigm shift from a dichotomy of online versus onsite learning to a more nuanced blend of self-learning and interaction. Blended Learning (BL) in this context is defined as the harmonious integration of self-learning and interaction learning and the synthesis of live and on-demand teaching approaches. This strategic combination forms a new extended classroom learning approach designed to seamlessly merge students' self-directed learning with interactive elements, promoting active learning.

Inprasitha (2023a) findings highlight the effectiveness of blending ODC, VLC, and FFC components within the BLC model. This combination offers students flexibility, accessibility, and diverse learning experiences. The approach accommodates various learning styles, enhances student engagement, and caters to individual needs. However, the specific blend and implementation of these approaches may vary based on subject matter, learning objectives, available resources, and student and teacher preferences. The ODC, within this framework, emerges as a dynamic and adaptable space that empowers students to become active participants in their educational journey.

Figure 2: Blended learning classroom (BLC) teaching approach (Inprasitha, 2021; 2023)

Research Methodology

Research Context

The participants comprised The Lesson Study team, which consists of twelve members: one mathematics teacher, three mathematics education researchers, three art teacher educators, and five mathematics teacher educators. Additionally, thirty-one upper elementary students from a northern Thailand school are participating in this study. This school was selected because it has been implementing the TLSOA (Inprasitha, 2022) as school-based professional development and is familiar with this approach.

Research Procedure

Before the program commenced, ethical approval for research was secured from the supervising board. Participants, having read the information, agreed to partake in the program.

Several data collections were recorded in audio and video formats. The video, audio recording, and lesson plan were used as research instruments. The data was collected from students' written worksheets, video recordings in the virtual live classroom, observational recordings, Interviews, field notes, and post-lesson discussion transcripts.

Data Collection and Data Analysis

The research methodology was a qualitative method based on lesson study processes, and the data were analyzed employing a qualitative method (Creswell & Creswell, 2022). Descriptive analysis was applied to interpret the data. The data from the first step of the Lesson Study in the TLSOA model (Inprasitha, 2022) were interpreted considering the framework for designing the problem situation (Inprasitha, 2016). The data was collected from students' written worksheets, video recordings in the virtual live classroom, observational recordings, Interviews, field notes, and post-lesson discussion transcripts. The data provides a comprehensive view and ensures accuracy through triangulation.

Result and Discussion

This study was conducted within the context of the TLSOA and focused on collaboration between teachers to improve their own and their peers' teaching practices through the Plan, Do, and See (Inprasitha, 2006; 2016; 2022), which was divided into two cycles, consisting of: Cycle of Lesson Study 1 (LS1): The LS team designs problem situations for the ODC with

steps 1-2 of the OA. and brings ideas that arise in class to analyze students' ideas and find guidelines for designing teaching in the next session. Cycle of Lesson Study 2 (LS2): Based on reflections in Cycle 1, the LS team used student ideas to design problem situations in Cycle 2 for the VLC/FFC with 4-step OA, as shown in Figure 3.

Cycle of Lesson Study 1

Within the first step – Collaboratively Plan, the lesson study team meticulously designed the students' learning activity, such as teaching materials and problem situations, emphasized the real-world context of students, and incorporated diverse perspectives in the psychomotor domain. This study's lesson plan is centered on crafting a joyful box to enhance students' spatial awareness by navigating between three-dimensional and two-dimensional concepts. The problem situation was separated into two problem situations. The first problem situation presents the task, "Let's create a box similar to those we encounter in everyday life." The conditions students are required to 1) trace each side of a box, 2) cut out the traced sides, 3) join each side together using adhesive paper, and 4) embellish the assembled structure to make it aesthetically pleasing. The second problem situation challenges students to consider the practicality of their creation by asking, "Can the crafted pieces be assembled into a functional box?" The condition is to let students construct a complete box from the pieces they have prepared (Figure 4).
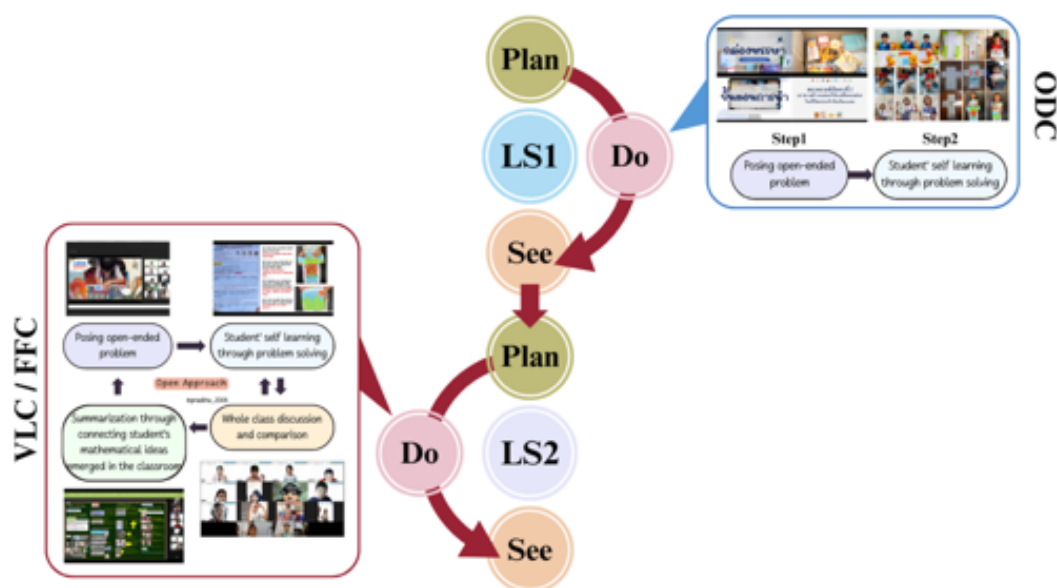
Figure 3: The cycle of Lesson development

Figure 4: Problem Situation, Condition and Anticipating Student Ideas

Collaboratively Do

Students' Ideas Form ODC

Through the activity, students demonstrated their ability to identify connections between two-dimensional and three-dimensional shapes. They successfully recognized relationships between the number of edges and faces. Furthermore, they showcased their creativity by constructing narratives on the unfolded box's faces through drawing and coloring, as shown in Figures 5 to 7.
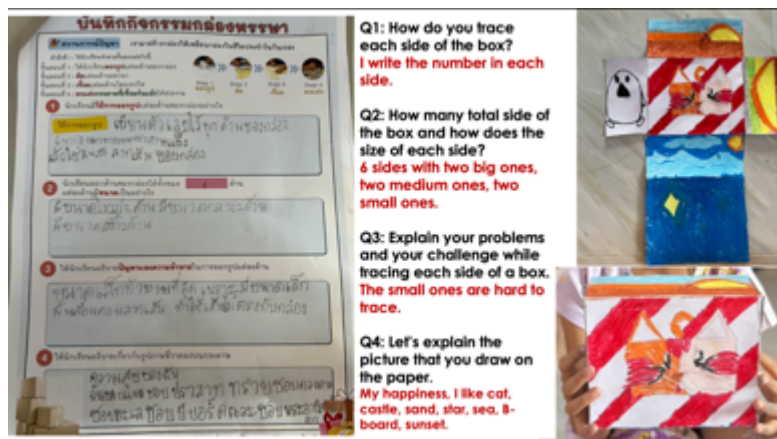
Figure 5: Student worksheet from ODC (1)
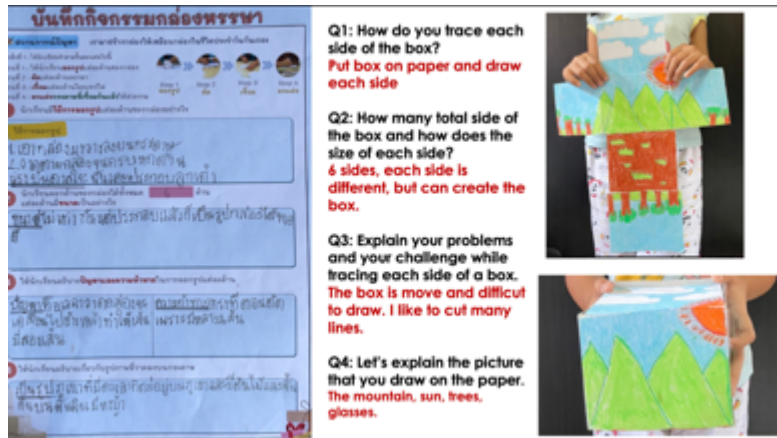
Figure 6: Student worksheet from ODC (2)
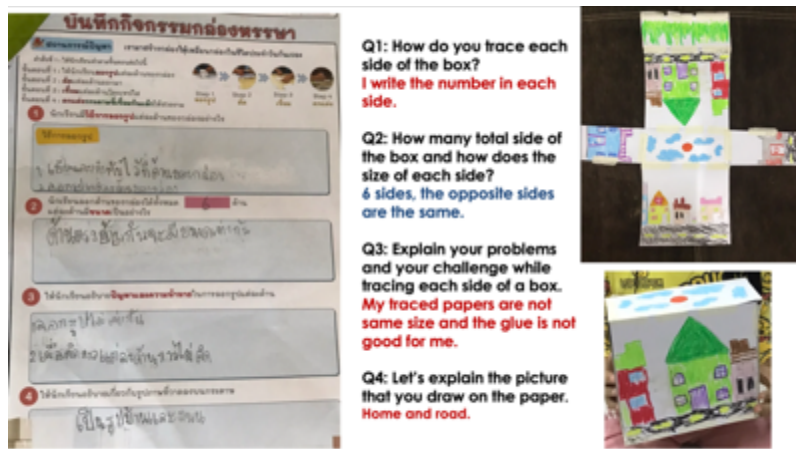
Figure 7: Student worksheet from ODC (3)

Taking the ideas generated from the students' preferences in the classroom, grouping them, and analyzing them to formulate questions for collaborative discussions in a virtual classroom has revealed that the questions elicited responses in the direction anticipated by the team (See Figure 8).
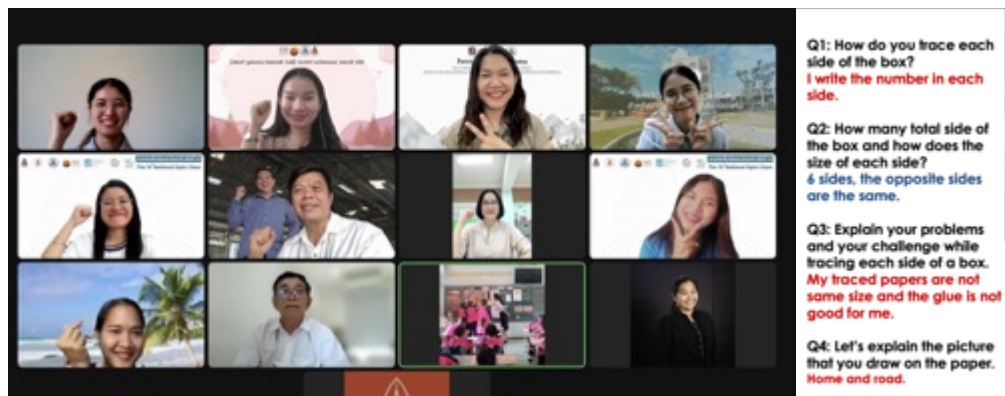
Figure 8: Collaboratively See and Questions

Students feel very confident in themselves and appreciate sharing their ideas in the classroom and appreciate others' ideas, as shown in Figure 9.

Figure 9: Student worksheet from VLC

Result ODC: Teaching Materials

The Lesson Study team responded to this challenge by creating a comprehensive set of teaching materials for the ODC. These materials included a box kit, an on-demand video, a worksheet, and a teaching guideline. The on-demand video introduced the necessary materials and provided step-by-step instructions for creating the box. Importantly, these teaching materials were deployed within the ODC, enabling students to engage in self-directed problem-solving in the comfort of their homes (Figure 10).

Result VLC: Teaching Material

Furthermore, the outcomes extended into the Virtual Live Classroom (VLC), where students' written works and assignments from the ODC (Figure 11) were utilized as additional teaching materials. This collaborative approach facilitated dynamic interactions between the teacher and students as they collectively presented and discussed ideas. Notably, students reported heightened confidence in expressing their thoughts and showed appreciation for both sharing their ideas and valuing others' contributions.

The results demonstrate successfully integrating carefully designed teaching materials into both the On-Demand and Virtual Live Classrooms. The multi-faceted approach enhanced students' problem-solving skills and fostered a sense of confidence and collaboration within the learning community.

Figure 10: A comprehensive set of teaching materials for the ODC
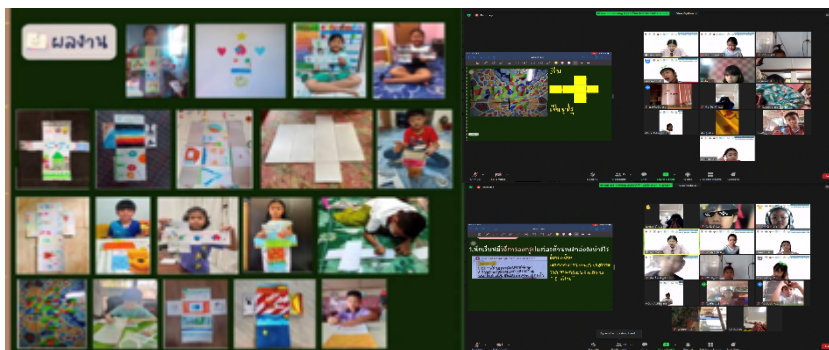
Figure 11: students' written works and assignments from ODC

Conclusion

This study has shed light on the pivotal role of problem situations within the On-demand classroom (ODC) and the effective integration of innovative teaching approaches. The Lesson Study team designed problem situations for the On-Demand VDO, drawing upon the TLSOA principles (Inprasitha, 2022) and Problem Situations, which emphasized the crucial elements of Context and Conditions (Inprasitha, 2016).

The focus on Context and Conditions extended into the design of teaching materials within the ODC, aligning with the TLSOA implementation model. Integrating the BLC model, coupled with the collaborative efforts of a Lesson Study and an Open Approach, emerged as a potent combination. This synergistic approach not only heightened students' engagement in problem situations but also facilitated diverse modes of communication, including written work, visuals such as pictures and clips, and verbal articulation.

Acknowledgment

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Rapid eLearning Development Tools in the UAE: Introduction of Structured eLearning Environments for Undergraduates

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Abstract

This study employed a blended learning approach, integrating a microlearning module on 'Change Management' into an undergraduate business course curriculum in the United Arab Emirates. This context being of interest because of the high 'Uncertainty Avoidance' dimension typical of the predominant Arab culture in the country. The study therefore, aaddressed the question of student adaptability and requisite support required for a successful blended learning experience in this cultural context. A cross-sectional survey was conducted with a sample group of 40 undergraduate students. A qualitative thematic analysis was applied, using Hofstede's cultural dimension of 'Uncertainty Avoidance', to measure student preference for either a structured or flexible learning environment. That methodological approach captured rich description from feedback, which allowed for an in-depth understanding of students' learning preferences and experiences with the micromodule. The study contributes to the field of academic knowledge about the influence of a cultural dimension for learner engagement. The dual value for teaching praxis from this study is firstly, consideration for the implemention of learning technology in international business classrooms and secondly, the implications of the introduction of pedagogical innovation for students in a nation experiencing rapid changes in both educational and economic spheres. The outcomes of this study provide insights into the practical application of rapid eLearning tools, offering strategies for educators and institutions of Higher Education.

Keywords: Rapid eLearning Development, Change Management Education, Cultural Adaptation in Learning, Hofestede's Cultural Dimensions, Arab Culture, Uncertainty Avoidance

Introduction

In an era marked by global uncertainty, the emergence of the COVID-19 pandemic catalyzed an unprecedented shift in education systems worldwide, which propelled Higher Educational Institutions (HEIs) toward online learning modalities. This sudden transition was not just a temporary measure, but became a catalyst for a longer term recognition of the potential for electronic learning (e-learning) within a traditional face-to-face (F2F) classroom. As HEIs emerged from the societal constraints wrought by the pandemic, the increased technical capabilities of faculty members, combined with the positive attitude of students, suggested the prolonged viability of a blended learning approach. More recently, the emergence of generative Artificial Iintelligence (AI) has increased the dilemmas and the potential of online learning. An increasing number of studies illustrate the feasibility of integrating technology in F2F education, demonstrating a growing interest in hybrid models (Singh et al. 2021). Blended Learning (BL) is traditionally defined as the integration of conventional classroom methods with online activities (MacDonald, 2006; López-Pérez et al., 2011), and has evolved significantly in response to educational challenges (McKeller & Barton, 2023).

This BL approach combines the strengths of asynchronous learning (such as self-paced modules) with the more traditional F2F instruction (including enhanced student-instructor interactivity), providing university students with a wider-ranging educational experience. An important factor in the decision to adopt BL and to explore AI tools, e.g. 'ChatGPT', is the capacity of technology-enhanced education to impact teaching and learning through offering unparalleled accessibility and flexibility to individual learners. Dimitrov and Kovatcheva (2022) expound on that aspect in emphasizing that BL benefits ensure it is more than just an educational trend. Instead, BL has evolved into a holistic approach, giving learners instantaneous and unlimited access to educational resources at the click of a button. Learners have immediate access to enhanced materials and having that access empowers them to engage with these resources at their convenience. This flexibility is instrumental in accommodating diverse learning styles and schedules, thus enhancing the overall efficacy of the educational process. The evolution of BL, especially in the context of higher education, signifies a paradigm shift in how knowledge is imparted in the digital age that generative AI will also accelerate.

The necessity for a BL approach was particularly underscored by critiques of earlier large-scale e-learning projects, which were criticized for lacking human interaction and support essential for student learning (Jones & Peachey, 2005; Jones & Lau, 2010). This criticism led to the enhancement of BL to include the flexibility of e-learning and vital human contact, thereby capturing the best of both worlds.

In the context of integrating online and traditional learning methodologies, which provide a spectrum of options to cater for learners' varied needs and preferences, Staker and Horn (2012) identified four primary models of hybrid education (part BL and part F2F). including the: 'Rotation' (students rotate on a schedule), 'Flex' (individually customized and fluid schedule), 'A La Carte' (pick and choose), and 'Enriched Virtual' (required F2F learning with instructor and then complete remaining coursework remotely). Each of these four models offer a unique approache to facilitate learning. The shift towards these models indicates the education sector's response to the challenges and opportunities presented by the necessity for remote learning during the pandemic and the subsequent transition back to the classroom. This has resulted in a renewed interest in the relevance of microlearning units, such as those created, like this study, on the platform 'Articulate Rise 360.'

In our study, it is the 'Enriched Virtual' that is the framework of exploration for integrating a microlearning module into a university-level traditional business course curriculum. This BL model was chosen for its flexibility, allowing students to supplement their classroom F2F instruction with additional online learning modules. This method aligns with the increasing preference for autonomous, self-paced learning experiences, which have become more prevalent after the pandemic's disruption to traditional education.

In this study, we also chose to explore microlearning. The concept further redefines BL by breaking down course content into smaller more manageable segments for the learner. Sometimes referred to as a "learning snack," microlearning focuses on a single topic and can be consumed quickly, making it ideal for students with busy schedules and immediate problem-solving needs. Unlike traditional eLearning courses, which resemble a complete meal with various components, microlearning provides concise, focused content that addresses a single objective or small number of learning outcomes.

Microlearning, as defined by Hug (2010), intersects with the domain of mobile learning, suggesting that educators can leverage microlearning tools to create content that is inherently compatible with mobile devices. This approach to learning is defined by its brevity and digital focus, allowing for quick, concentrated learning experiences. Practical applications of microlearning can range from short digital text excerpts and quick video clips, followed by a concise quiz, to micro podcasts that learners can consume on the go.

Microlearning has been integrated into BL strategies, mainly through using platforms such as 'Articulate Rise 360', which facilitates the creation of concise educational content. 'Articulate Rise 360', a tool known for its rapid development capabilities, allowed this investigative team to design and deploy microlearning content efficiently. We argue that our module on 'Change Management' aligned with learner and instructor demands for timely and relevant content dissemination in educational settings.

The mobile-friendly and multi-device compatibility of 'Articulate Rise 360' ensures that learners have access to educational material across various digital platforms, so they can watch content on their phones or their laptops at any time and in any place, thus accommodating the contemporary trend of mobile and flexible learning. The platform's design also allows for educational content to be readily updated, supporting the dynamic nature of knowledge and the necessity for continuous learning and enabling user feedback. Both these features were taken into account for development of the learner survey, as well as how the learners accessed information, plus respondant suggestions for improvement.

While not the only eLearning development software option, 'Articulate Rise 360' capacity to streamline the creation of micro-learning modules does align with the instructional needs of university educators and students and, therefore, facilitated the development of short, targeted learning experiences integral to a comprehensive BL strategy. This reflects a shift towards educational methodologies prioritizing flexibility, learner autonomy, and the efficient use of technological resources in the learning process, significant trends which will continue particularly given the increasing prevalence of generative AI.

In summary, microlearning in a BL environment serves a tripartite function: it prepares learners pre-training, enhances the in-session learning experience, and reinforces knowledge post-training. Microlearning aligns with the learner's journey, offering tailored content that is

both accessible and efficient, ensuring continuous engagement and assimilation of knowledge.

The advent of BL has revolutionized the educational landscape on a global scale and brought forth unique cultural dynamics within specific regions. As we transition from the broader context of BL to the particular milieu of the UAE, we argue that it is essential to consider the cultural dimensions that influence the adoption and implementation of BL.

With its rapid technological advancement and diverse international population, the UAE presents a distinctive case for the study of BL. Kemp's (2013) study delves into the impact of the cultural dimension of 'Uncertainty Avoidance' for the adoption of BL among management undergraduates in the UAE. This study revealed students' learning experiences were both positively and negatively affected by their cultural dimension of 'Uncertainty Avoidance' when introduced to BL, particularly notable because of their technological skills, their reactions to course organization, and their appreciation of online feedback. Furthermore, the results of the study underscored student challenges with the novelty of online activities and raised the demand for higher-quality research methods.

Kemp's (2013) findings are particularly relevant to our study, which aims to explore the effectiveness of a microlearning module centered around 'change management' within the UAE's business education sector. Our research considers the cultural backdrop of high 'Uncertainty Avoidance' characteristics in the UAE and how that shapes students' engagement with new and interactive learning technologies. By integrating rapid eLearning tools like 'Articulate Rise 360' within a structured pedagogical framework and local values, our study addresses the distinctions of student adaptability and the requisite support for successful BL experiences.

In this regard, our study seeks to contribute to the body of knowledge on implementing learning technology in international business classrooms. By examining the early stages of transformation involving microlearning, we aim to understand the implications of such pedagogical innovations for students in a nation navigating rapid changes in its educational and economic spheres. The outcomes of this inquiry will provide insights into the practical application of rapid eLearning tools, offering strategies to educators and HEIs for effectively harnessing technology to enhance teaching and learning, whilst also considering the cultural dimensions that influence learner engagement in the UAE.

In light of the evolving landscape of eLearning and its increasing adoption in higher education in diverse settings around the globe, understanding student preferences from a variety of cultures and their experiences becomes pivotal for effective course design and delivery. We argue that this is particularly crucial when considering undergraduate students studying in the UAE, who represent a diverse demographic with varying learning styles and cultural backgrounds. A key aspect in this context is the role of cultural dimensions, such as 'Uncertainty Avoidance', which significantly influence learning behaviors and attitudes. The feedback from undergraduate students on the change management module, developed using 'Articulate 360', offers a unique opportunity to delve into these aspects. Feedback not only sheds light on learner preferences for structured versus flexible learning approaches but also provides a window into how these choices align with broader cultural traits. Therefore, to deepen our understanding and enhance the effectiveness of eLearning modules, it becomes essential to ask:

> RQ1: *"How does Hofstede's cultural dimension of 'Uncertainty Avoidance' influence undergraduate students' preferences in the UAE for structured versus flexible learning approaches in an eLearning environment, as demonstrated by their engagement with the change management module developed in 'Articulate 360'?"*

This question aimed to investigate the impact of cultural factors, specifically 'Uncertainty Avoidance', on undergraduate students' learning preferences within an eLearning module. It seeks to understand how the local and regional cultural dimensions shape their attitudes towards structured and flexible learning methods.

> RQ2: *"What are the key factors contributing to the effectiveness of eLearning modules for multicultural undergraduate students, in the context of structured and flexible learning environments, as reflected in the feedback on the change management module?"*

This second question delves deeper in exploring the broader aspects of eLearning module design and delivery, to discover what resonates with undergraduate students. It is focused on identifying which elements within both structured and flexible learning environments contribute most significantly to the effectiveness of eLearning from the perspective of undergraduate students.

Designing the Microlearning Unit on 'Change Management'

The microlearning unit on 'Change Management' was crafted by two Mass Communication students of Arab origin, co-authors of this research paper, under the supervision of a multidisciplinary team of investigators. This project represents a collaborative effort combining academic insights and practical application. A subscription to 'Articulate' was secured to facilitate the design process, enabling the research team to tailor the content and structure based on the course material provided by the faculty member originally teaching the change management module.

Structure and Content

The unit's structure and content were purposefully organized to maximize learning effectiveness. The content creators reflected that they took special interest in portraying the students' characteristics by creating a persona (a united representation) that was catered to in order to create the best learning experiences. The module commences with an engaging welcome video from the faculty member, framing the context and purpose of the module. The content delves into the concept of change, highlighting both its inevitability and the common resistances to change when encountered by individuals and business leaders. Salient facts about change management underscore its complexity and associated challenges within the context of the third-year undergraduate course, 'Business Communication'. Definitions, such as 'Organizational Change' and 'Change Management,' were provided to lay a solid foundation for understanding.

The unit explored theories of both internal and external forces of change, illustrating the complex nature of the phenomenon of change. It introduces various change management tools, to empower students with practical solutions for navigating change. The conditions necessary for successful change implementation were also elaborated upon, offering insights into effective change management strategies.

Notably, the module presents 'Lewin's Three-Stage Change Model', a classic framework for understanding organizational change. Additionally, it references the ADKAR (Awareness, Desire, Knowledge, Ability and Reinforcement) Model, providing an alternative perspective on managing change effectively. The unit culminates with a closing message from the professor, encapsulating key takeaways and offering a comprehensive summary of the topic. This curated assembly of content and structure is structured to provide as rich and impactful learning experience for students as possible as they engage with this microlearning unit.
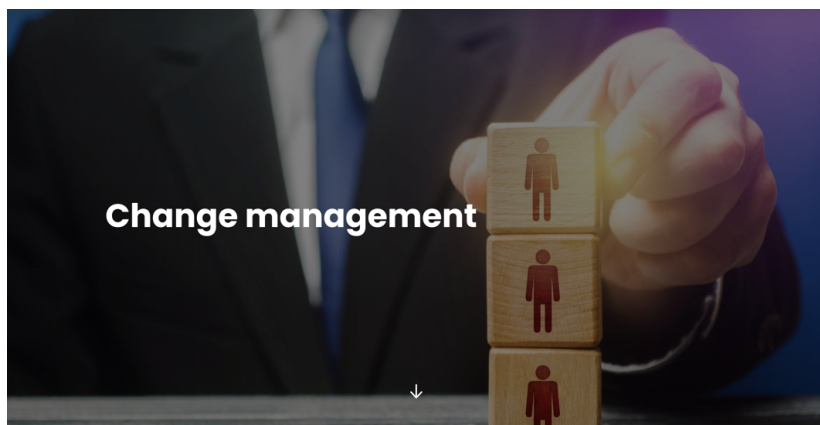
Figure 1: Opening splash-screen of the 'Change Management' Microlearning unit
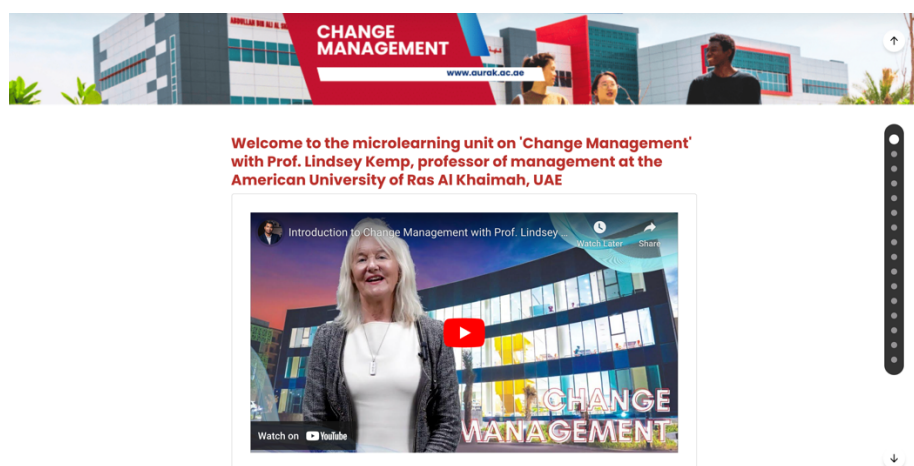
Figure 2: The unit opens with a video introduction by the faculty member
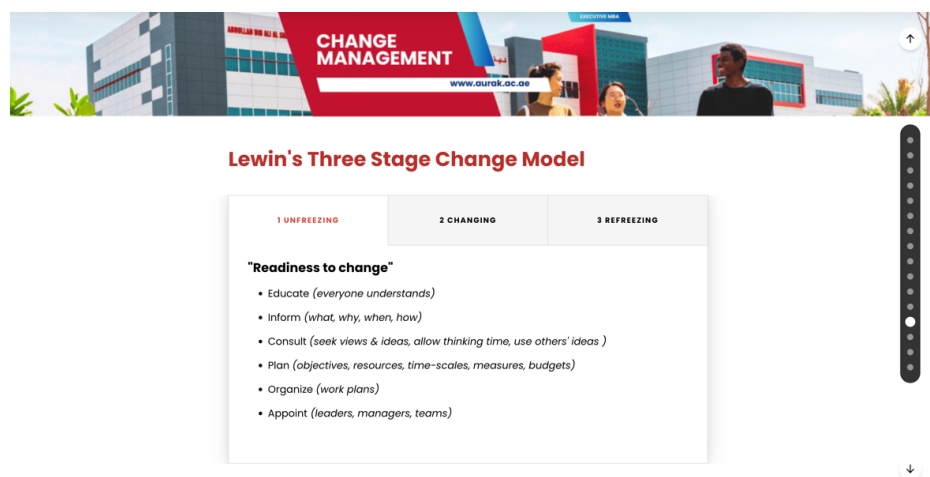
Figure 3: Example of interactive feature such as 'Accordion Interactivity' in the unit

Interactive Features

The 'Change Management' microlearning unit, developed with 'Articulate Rise', features several interactive elements to enhance learner engagement outlined below.

- **Accordion Interactivity:** Condenses extensive text into digestible sections under clickable headings, ideal for exploring complex concepts without overwhelming learners.
- **Tabs Interactivity:** Facilitates learning about related topics through clickable tabs, effectively organizing and presenting a large volume of information.
- **Flashcard Grid and Stack:** Interactive flashcards that reveal information upon clicking, with a grid layout for multiple cards and a stack format for sequential exploration.
- **Labeled Graphics:** Uses images with clickable hotspots, enabling learners to investigate different components or parts of an equipment visually.
- **Process Block:** Displays linear concepts in a step-by-step manner, functioning like a slideshow to guide learners through processes.
- **Button Navigation:** Offers navigational ease and external linking through clickable buttons, which can lead to external sites, different course sections, or facilitate email communication.

These features collectively offer designers the chance to create a dynamic and engaging learning environment and the flexibility to choose to provide more or less structure, present the learning material of the module as dynamic or more simply or to use a different color palate.

Methodology

This study combines methodologies in order to provide a comprehensive analysis of undergraduate student feedback on a change management eLearning module and to examine if there is a culturally-based connection between the use of a BL module and student satisfaction. Developed using 'Articulate 360', this module was utilized by predominately Arab students at an American University in the UAE, allowing exploration of the effectiveness of the module and to understand students' learning preferences and experiences in the context of structured versus flexible learning approaches.

Instruments and Data Collection

1. **Data Sources and Tools**:
    - The primary data source was an online 'Google' forms utilizing an 'Excel' spreadsheet, to capture feedback from undergraduate students through a structured feedback mechanism within the eLearning module.
    - Additionally, a confidential survey was administered to different cohorts of university students to evaluate their satisfaction and experiences with BL. This survey employed a narrative data collection approach, focusing on individual insights and interpretations.
    - 'Padlet', an online interactive bulletin board, served as a secondary tool for collecting student feedback. This platform allowed asynchronous submission of reviews and comments, offering diverse insights into student experiences with the module.

2. **Feedback Content and Data Points**:
    - The feedback included qualitative data in the form of text comments, where students shared their views on the module's structure, content clarity, and the flexibility of the learning path.
    - The survey sought to measure levels of student certainty and uncertainty regarding the introduction of BL, capturing their unique insights and interpretations.

3. **Demographics**:
    - The participants were primarily undergraduate students enrolled in a business course, with the survey extending to a broader demographic of university students in the UAE.

4. **Research Design**:
    - Adopting a cross-sectional survey design, this observational study analyzed information about a population of university students at a specific point in time, complemented by the longitudinal feedback data from the eLearning module.

5. **Data Collection Summary**:
    - The duration of data collection was aligned with the completion of the eLearning module, ensuring timely and relevant feedback.
    - The volume of data from both the survey and the eLearning module feedback provided a rich qualitative dataset for analysis.
    - Throughout the data collection process, student confidentiality was rigorously maintained to encourage genuine and honest responses.

Data Analysis Approach

- The study employed qualitative methods, primarily thematic analysis, to identify prevalent themes in the student feedback.

- The analysis was aligned with Hofstede's cultural dimensions, particularly focusing on 'Uncertainty Avoidance', to understand students' preferences for structured or flexible learning environments and their overall satisfaction with the BL experience.

Sample and Research Instrument

Sample
The study surveyed a total of 40 undergraduate students enrolled in a 'Business Communications' class at the XXX (name of university) during the Fall semester of 2023. Reflecting the diversity of the UAE's student population, the members of the sample group includes approximately 40 percent local Emirati students, 30 percent from Arab countries such as Jordan, Syria, Egypt, and Palestine, 15 percent from South Asian countries, e.g. Pakistan and India, and 15 percent from various nationalities including African countries such as Sudan, Tanzania, and Ethiopia. The School of Business was selected for its representative demographic spread which aligns with the broader student body of the UAE, allowing for potential generalization of the study findings to a wider population.

Research Instrument
The university maintains comprehensive demographic data on its student population, including age (with most students aged between 21-24 years), gender (approximately 55%

male and 45% female), and nationality. A notable portion of the student body, although nationals from countries other than the UAE, have been born and raised locally, with half of the foreign nationals enrolled indicating this background. This diverse cultural tapestry, with many students having been influenced by the dominant Arab culture and its high score for Hofstede's dimension of 'Uncertainty Avoidance', provides a rich context for examining the impact of cultural dimensions on elearning.

The learning module, along with the accompanying survey, was integrated into the university's learning management system (LMS), 'Blackboard Ultra'. The survey was designed to elicit in-depth student narratives, asking participants to reflect on four key areas: their review of the module, learning outcomes, applicability of the learned content, suggestions for improvement, and any additional comments they wished to share.

Following the precedent set by Kemp (2013), the survey was kept succinct with 'open' questions to foster detailed responses. Participation in the survey was not tied to any extrinsic monetary incentives. Anonymity and confidentiality were upheld using the LMS's features that ensure student names and identifiers are not disclosed.

Data Collection Approach

To garner in-depth insights and foster continuous improvement of the eLearning module, participants were engaged in a reflective exercise. The students were prompted to provide feedback on several aspects of their learning experience as the survey was structured to guide students through a sequence of reflective prompts. These prompts invited students to:

- Reflect on their process of engaging with the module and the duration of their review.
- Articulate their learning outcomes, specifically regarding change management concepts.
- Consider the practical application of these concepts within the realm of business communications and project their impact on future professional roles.
- Offer constructive suggestions for enhancing the module's structure and content to better facilitate student engagement and address knowledge gaps.
- Share additional thoughts or queries pertaining to the change management module.

The questionnaire eschewed the traditional five-point 'Likert' scale format to allow a more nuanced exploration of student experiences. Designed to align with 'Bloom's' taxonomy of critical thinking skills, the survey progressed from basic comprehension to application and evaluative judgement. The research team, comprised of three professors with expertise in BL, content creation, and digital media, meticulously reviewed the survey instrument to ensure content validity and relevance to the study's aims.

Findings

Hofstede characterized the national culture of Arab countries, through cultural dimensions, where they scored high 'Power Distance', relatively strong 'Uncertainty Avoidance', and more Collectivism than Individualism with moderate Masculinity/Femininity values. This cultural backdrop provided a critical lens through which the feedback on the eLearning module could be analyzed, particularly in the context of the UAE (Hofstede et al., 2010).

The qualitative analysis aimed to evaluate feedback from undergraduate students on a stand-alone eLearning module on 'change management' developed using 'Articulate 360'. This

module was introduced into a business course at the xxx University. Feedback was collected from a diverse group of undergraduate students (#40) to assess their learning experience.

Grounded in the cultural dimension of 'Uncertainty Avoidance' (UA), this analysis draws upon the findings of Kemp (2013), who noted a preference for 'risk avoidance' within the learning environment among undergraduate students in the UAE.

From the feedback, two predominant themes emerged, indicating the undergraduate students' learning preferences:

Structure
The feedback revealed a significant preference for structured learning, with 46 instances where students expressed a desire for well-defined course structures and content. For instance, an undergraduate student noted, "It was easy to follow the module because of its structured format." This preference aligns with a higher UA, suggesting that clear, organized content is essential to these students.

Clarity and Understanding
Clarity in instructions and content emerged as a crucial theme, noted 24 times in the feedback. Undergraduate students demonstrated a high value for straightforward and comprehensible learning materials, indicative of strong UA tendencies.

Appreciation for Flexibility
Despite the overall preference for structure, there was also an appreciation for flexibility in the learning process. This was reflected in 19 instances where students acknowledged the benefit of having control over their learning journey, as one student remarked, "The module allowed me to choose what to study first, giving me control over my learning."

Differential Insights From Undergraduate Feedback
The undergraduate feedback underscores a significant inclination toward clarity and structured formats, reinforcing the cultural tendency toward higher UA within this demographic. However, the recognition of flexible learning elements suggests a nuanced balance of preferences that eLearning design must accommodate.

Implications for eLearning Design
These findings from undergraduate students highlight the need for eLearning modules that are tailored to the cultural context of the UAE. A clear, structured learning environment, complemented by flexible learning options, is crucial to meet the diverse needs of the student body.

Student Reflections on Structured Clarity and Flexible Learning Paths

In analyzing the feedback from undergraduate students on the change management eLearning module, a distinct preference emerges for structured and clear learning experiences. This preference is rooted in a cultural context that highly values UA, as theorized by Hofstede. Students consistently expressed a desire for a learning environment characterized by well-defined objectives and straightforward content delivery. This inclination aligns with a higher UA, where predictability and order are paramount in educational settings. Simultaneously, there was an acknowledgment of the value of flexibility within this structure, allowing students to tailor their learning journey. The following student quotations illustrate these

themes, shedding light on the nuanced balance of structure and flexibility that caters to diverse learning preferences.

Quotes Reflecting Comfort With Structure and Clarity

- "It was easy to follow the module because of its structured format." - This quote suggests a preference for a well-organized approach to learning, consistent with higher UA.

- "The structured layout...appreciated." - Acknowledgement of structured content indicates a desire for clarity and organization.

- "I liked how the module was designed...to keep [us] focused." - A well-thought-out design that aids concentration aligns with a preference for structured learning environments.

- "It took me around 25 minutes to check out the module...spent on Lewin's three-stage transformation model..." - Focusing on specific models shows a methodical approach to learning.

- "The taking notes approach allowed me to learn...and also helped me to recall it later." - A systematic method of learning, indicating higher UA.

Quotes Reflecting Openness to Flexibility Within Structure

- "The module allowed me to choose what to study first, giving me control over my learning." - This indicates a balance of structured content with the flexibility of choice.

- "It took me 20 minutes to review my online self-paced activity..." - Comfort with self-paced learning suggests an openness to a certain degree of flexibility.

- "I reviewed the change management module online...I spent approximately an hour to fully view, understand, and receive the final message." - The time invested reflects a willingness to explore the content at one's own pace.

These insights from the feedback illustrate that while there is a significant inclination towards structured learning, as indicated by the multiple mentions of a "structured layout" and appreciation for "clear" and "focused" content, there is also an appreciation for the flexibility offered by the module. The ability to control the pace and path of learning, as some students highlighted, represents a balance between the need for structure and the benefits of a flexible learning environment. These findings should guide the design of future eLearning modules, ensuring they provide clear, organized content while also offering opportunities for learners to engage with the material in a way that suits their individual learning preferences.

Conclusion

The analysis of undergraduate feedback on the eLearning module emphasizes the importance of integrating cultural dimensions and learner preferences into eLearning design. By accommodating the varying degrees of UA and providing a balance between structured and flexible learning elements, educators can foster more effective and engaging learning

experiences for a diverse undergraduate cohort. Our study's findings resonate with certain aspects of previous research, illustrating common patterns in online learning behaviors.

Mirroring the findings of Fung (2004), this study also reveals a certain reluctance amongst learners towards specific aspects of online learning. In line with Fung's observations regarding students' disinclination to engage in online discussions, our data reflects a similar pattern among undergraduates. The participants in our study demonstrated a clear preference for well-organized and straightforward learning resources, favoring reading and structured study over interactive elements like discussion boards.

This preference for structured content over interactive online elements underscores a significant inclination towards traditional learning methods, even within online formats. Such findings highlight the need for eLearning platforms to evolve, offering features that enable students to tailor their learning journey to their personal preferences and learning styles.

In conclusion, the research underscores the critical role that cultural dimensions and learner maturity play in the design of eLearning experiences. Adapting content to suit different levels of learner understanding and ensuring a balance between structured and flexible components is key to enhancing engagement and learning outcomes. This approach becomes increasingly important in achieving successful educational results in diverse and multicultural academic settings, such as those found in the UAE. Our study contributes to the ongoing discourse on eLearning by confirming and extending the implications of previous research (Fung, 2004) within the context of the Arab Group's cultural characteristics as outlined by Hofstede (1991), providing a contemporary understanding that can be applied to the design of eLearning experiences in similar cultural settings.

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An Assessment of TOEIC Listening and Reading Proficiency Tests of Foreign Graduate Students: Basis for Comprehensive Enhancement Program

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Abstract

This study aimed to assess the current English Proficiency Program of the foreign students enrolled in the Claro M. Recto Academy for Advanced Studies at LPU Manila during the academic year 2021-2022. A Mixed Method research design was used in this study specifically an Explanatory Sequential, that explores both quantitative and qualitative data. The researchers collected and analyzed the TOEIC results of the 179 foreign graduate students about their English proficiency, both in listening and reading skills, and then collected an online survey to explain and elaborate on the significant experiences of the 25 students in taking up the English Proficiency program. It was revealed that most of the participants are classified in the Basic Working English Proficiency level which indicates further improvement in the language facility that will help them in the workplace and academic communication. These findings indicated that the respondents perceived the English Enhancement Program as having a positive and huge impact on their language acquisition in English. This implied that the existing program has an effective way to develop and improve the proficiency level of the English language. However, it was revealed in the findings that most of the respondents are still recommending the existing program to be revisited and improved that cater to the demands of the language learners.

Keywords: English Enhancement Program, Explanatory Sequential, Foreign Graduate Students, TOEIC

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1. Introduction

English plays an important role in our everyday life. It is used in various fields such as business, academia, media, entertainment, and the international business community. To communicate across national borders and maintain correspondence with overseas business parties or professionals, English is essential. Moreover, English is important for higher education and specialized training. Most of the books on any subject are written in English or quickly translated into English. English is the medium of instruction in Education in most universities and higher education institutes of the world. This is essential for getting easy access to any information.

International students, many of whom are non-native English speakers are challenged by academic language demands and a new culture. Differences in educational systems and expectations, listening skills, professors' strategies and examples, the quantity of reading, direct writing styles, critical analyses, class participation, oral communication, and vocabulary present difficulties. Professors perceive international students to have difficulty with oral and written communication, which can affect course performance. Most international students need a minimum score on an English proficiency examination to achieve their respective career and academic aspirations. Thus, international English standardized examinations are very important to determine the level of their English proficiency. This can demonstrate the mastery of English and can be beneficial for resume building, job and internship qualifications, scholarship applications, and educational background.

Meanwhile, The TOEIC test was developed by the Educational Testing Service (ETS) in response to the request of the Japanese Ministry of Trade and Industry and was first launched in Japan in 1979 (M. Chapman, 2004). According to ETS, the test aims at assessing English-language skills in the workplace (ETS, n.d.-a); and it can be specifically used "to recruit, place and promote the most qualified employees"; "identify job-training requirements"; "assign 5 employees to positions overseas" (ETS, n.d.-c). For approximately the first 30 years of its existence, the test assessed only the two receptive language skills – listening and reading.

However, these tests can be inaccurate in showing a real level of academic knowledge about skills in speaking, reading, and writing English (Sawir, Marginson, Forbes-Mewett, Nyland, & Ramia, 2012). Hattingh (2016) discovered that international students were passing English-based tests such as the International English Language Testing System (IELTS) to gain entrance into other foreign institutions. Phakiti, Hirsh, and Woodrow (2013) proposed that personal considerations such as self-motivation, self-regulation, and self-efficacy significantly and positively influenced English proficiency for international students.

In this study, the researchers opted to determine the background in the English language and the English proficiency level of foreign students enrolled in the graduate program of the Lyceum of the Philippines University, Manila during the academic year 2021-2022. After further descriptive analysis of the respondents, the researchers assessed the existing English Proficiency Program of the institution to further improve its effectiveness and adequacy to strengthen their language fluency in the macro skills of the English language. Oxford (2017) emphasized that successful direct instruction training should teach students to identify the language learning strategies, practice the approach, and to evaluate its effectiveness.

1.2 Research Questions

The study aimed to assess the TOEIC listening and reading test scores of LPU Manila Foreign Graduate students as a basis for enhancing the English Proficiency program at the Graduate level. The following research questions will be answered at the end of the study:

1. How do the TOEIC listening and reading test scores of LPU Manila Foreign Graduate students serve as the basis for enhancing the English Proficiency program at the Graduate level?
2. How may the respondents be described in terms of?
   - Age
   - Current Job Position
   - Attitude in English language learning
3. What is the listening and reading proficiency level of the respondents?
4. What are the factors influencing the TOEIC listening and reading tests of the respondents?
5. What are the common challenges encountered by the students in taking the English Proficiency Program?
6. How may the findings of the study be utilized in improving the English Proficiency Program?

1.3 Significance/Rationale

This study would be beneficial to international students, educators, and the institution. The results of this study identified how educators in graduate studies might create programs that could be more efficient in teaching international students how to adjust and improve their English proficiency level. Educators should revisit the crafted syllabus of the program, based on these findings to ensure that international students are receiving the best educational opportunities.

2. Methodology

This study made use of **Mixed mixed-method research** design that explores both quantitative (numerical) and qualitative (descriptive) data to further understand the research problems and generate research findings and conclusions. Specifically, an **explanatory sequential design** was used as a method of investigation through an electronic questionnaire that included both closed- and open-ended questions. The researchers collected and analyzed the TOEIC results first as the basis of quantitative data about the English Proficiency Skills of the respondents both in listening and reading skills, and then conducted an online survey to explain or elaborate on the significant experiences of the foreign students in taking up English Proficiency course in the graduate program. According to Hassan (2022), the researcher may use the qualitative data to clarify unexpected or contradictory results from the quantitative analysis.

The researchers used purposive sampling. The respondents for the quantitative data were 179 foreign graduate students. Meanwhile, the 25 foreign graduate students were asked about their significant experiences in taking up the English Proficiency Program during the academic year 2021-2022 at Lyceum of the Philippines University, Manila. The researchers devised a research questionnaire based on the significant research experiences of the respondents.

The construction of the instrument was based on the statement of the problem and relevant research gaps in the literature and studies related to the study. The questionnaire was submitted to the three English language experts for approval and revision. All the suggestions and recommendations were incorporated into the final draft. Retrieval of the responses was undertaken as soon as the questions were answered. The researchers used the following instruments and techniques to obtain the data needed for this investigation:

The researchers used the TOEIC results and questionnaire as a primary source of data in obtaining relevant information. This is divided into two parts.

The First Part- *TOEIC Test Scores.* The researchers described the TOEIC listening and reading skills test scores of the participants and their demographic profile such as their age, nature of work, current job position, and attitude toward English language learning.

Second Part- *The Perceived Challenges and Opportunities in Learning English.* The second part of the survey describes the participants' challenges, initiatives, and opportunities in learning English.

The statistical techniques presented here are mixed methods. Descriptive statistics deals with the techniques used to describe the variables (median, frequency, percentage). Moreover, to analyze the qualitative data that is collected for the study, a thematic analysis was utilized. Thematic analysis is an effective method to analyze qualitative data in that allows researchers to summarize, highlight, and interpret multiple data sets, and the analysis method has great flexibility in terms of the type of research questions needed to be answered, and the type and amount of data needed to interpret (Kiger and Varpio, 2020). This is done by giving labels to important words or phrases in the data that represent the themes of the responses.

The data gathered were statistically treated using the Weighted Mean and Standard Deviation. This was done to establish the average of the collected data or the mean itself and the gap or the distance between each result. A low standard deviation indicates that the data points tend to be close to the mean. Percentage displays the data that specifies the percentage of observations that exist for each data point or grouping of data points. It expresses the relative frequency of responses and other data. On the other hand, frequency refers to the number of times a data value occurs. Lastly, SPSS Software v, 26 was used in the analysis of data.

During the conduct of this study, the researchers considered different ethical considerations.

The following ethical considerations were strictly observed:

Informed consent is a vital part of every research study. It is the responsibility of the researchers to protect the rights and freedom of the target respondents from forced participation. Respondents chose whether to participate in the information-gathering process. They were not forced to participate in any way. Respondents have the right to withdraw at any time and for any reason. If the respondents do not want to answer the questions, the researchers respect their decisions. The researcher adhered to the highest standards of ethical practice in research. Informed consent, autonomy, anonymity, dignity, and safety were given utmost attention.

To ensure the protection of participants' anonymity and confidentiality, their names or identities were disclosed at any stage of data collection, analysis, and reporting of the study results.   The privacy and confidentiality of the responses, as well as the participant's experiences, data analysis, and dissemination of the findings, were carefully managed throughout the study and the writing of the manuscript.

The researchers strictly adhered to the provisions of Republic Act No. 10173, also known as the Data Privacy Act of 2012. Participants' consent was obtained for the use of their data exclusively for research analysis purposes, and the information provided was not utilized for any other purposes unrelated to academic and research endeavors.

The participants in this study were given one week to complete answering the survey questionnaires. They did not pose significant risks or inconveniences in any other way. The data is kept private and confidential. Participation in this study was voluntary. No additional information was disclosed unless required by the study, and any relevant data was used solely for this study.

Benefits such as awareness and knowledge about the importance of English language learning can be gained by the participants taking part in this study.

The participants were assured that the results would be transparently reflected once the study was concluded. If participants need access to the study's results, they can send a message to contact the researchers, and the file will be accessible to the participants.

3. Results and Discussion

Firstly, a brief profile of the participants is presented. All initial codes relevant to the research questions were incorporated into a theme. Braun and Clarke (2006) also suggest the development of thematic maps to aid the generation of themes. These helped the researchers to visualize and consider the links and relationships between themes.   All the themes extracted from this study are interrelated, from analyzing the data it emerged based on the experience in the English Enhancement Program.

Figure 1: Profile of the Participants
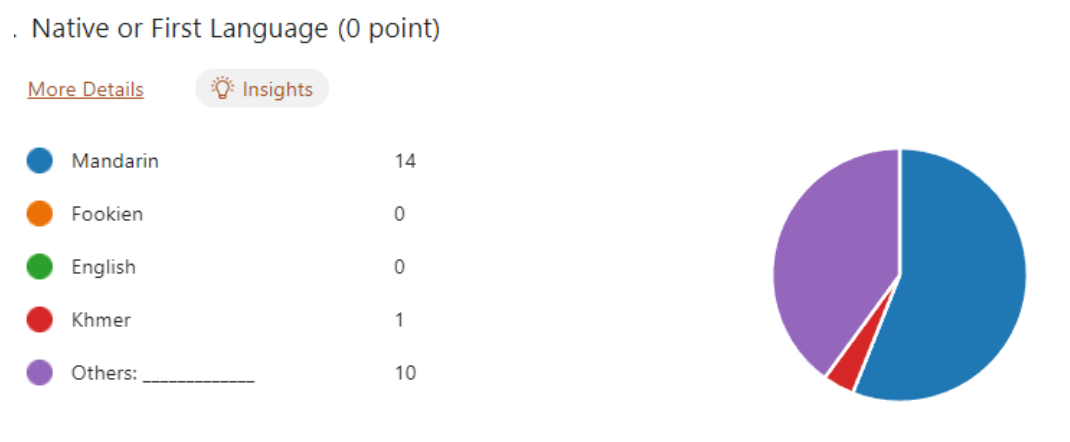
According to Kramsch (2013) language, not seen as a linguistic system, but seen in context is a coherent symbolic system for making meaning. (Kramsch, 2013) In this sense, it cannot separate the study of language and language learning from culture and the context that

surrounds the learner, especially when it refers to the learning of a foreign language. From this study, the majority of the respondents, (fourteen) 14, speak Mandarin as their native/first language. A total of eleven (11) participants speak another native language. According to the National Clearinghouse for Bilingual Education Journal (2000), students who learn English and continue to develop their native language have higher academic achievement in later years. In this assertion, it is a good implication that the respondents have higher academic achievement in their education. It is strongly supported by the study of Madriñan (2014) that students who have strong first language skills can acquire a second language more easily due to language transfer. Furthermore, she stressed that the mother tongue could be used as support for the second language acquisition process, which makes the learning process easier for students and teachers. Hence, having a good foundation in the native language can scaffold the English language acquisition as the respondent's second language.

Figure 2: Age of the Respondents
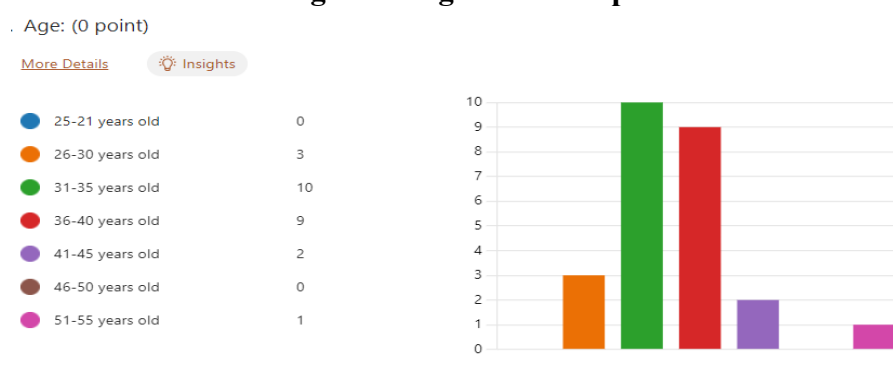
The respondents are mostly adults. Most of the respondents of this study are in the age of 30s specifically from 31- 40 years old. It is stated in the study of Ruyun Hu (2016) that there is a critical period for second language acquisition. It further elaborated that children have a great advantage over adults or adolescents This critical period is used to refer to the general phenomenon of declining competence over increasing age of exposure. This hypothesis was first introduced by Penfield and Roberts (1959).

As well, Ellis (1986) observes that there is a period when language acquisition can take place naturally and efficiently, but after a certain age, the brain is no longer able to process language in this way. This critical period is defined by Scovel (1988) in the following manner: In brief, the critical period hypothesis is the notion that language is best learned during the early years of childhood and that after about the first dozen years of life, everyone faces certain constraints in the ability to pick up a new language.

Morford and Mayberry (2000) note that individuals who are exposed to language at earlier ages consistently outperform individuals exposed to language at earlier ages for first and second languages of both signed and spoken languages. This assumption agrees that people will perform well in language learning at an early age. This is the hypothesis for the "the younger the better" position.

Another opposite view is 'the older the better'. It illustrates that older language learners are more successful and efficient than young learners. Some studies have been done to support this view. Ekstrand (1976) reveals that L2 learning ability improves with age. In Harley's research (1986), he favors the faster acquisition rate among later beginners. Therefore, the older learners are the efficient language learner.

Figure 3: Current Job Position
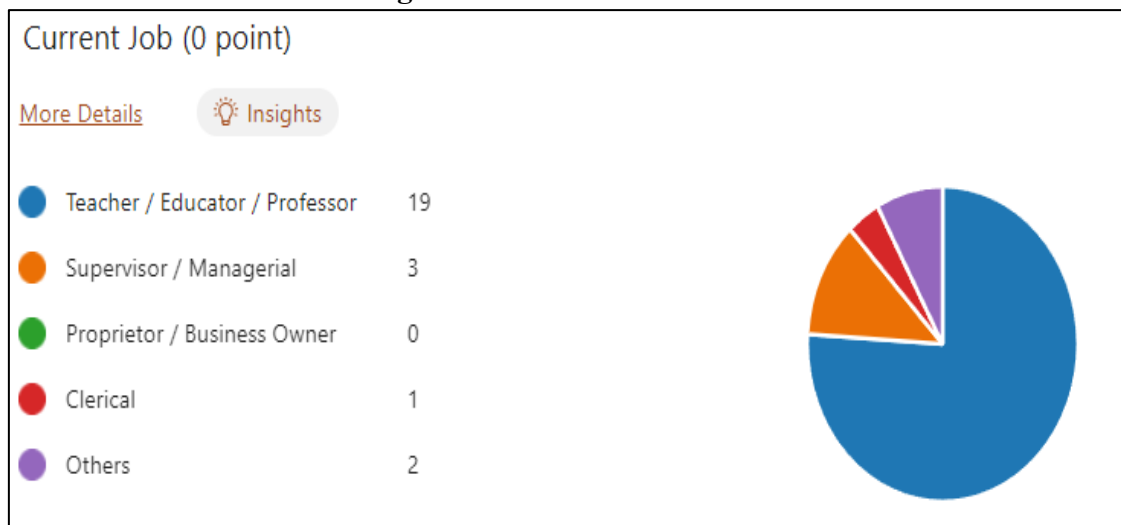
Being the lingua franca of the world, the role of the English language in a globalized world is undeniable. Communicative skills in English could create countless opportunities for an individual in today's job market. Admittedly, proficiency in English could be a determining factor in leaving a good first impression in job interviews. Considering the different fields in a job sector necessitates English language proficiency. The participants are mostly educators. Nineteen out of twenty-five are in the academe field. Three (3) of them are in managerial/supervisory positions and others are in clerical and other fields.

Attitude in English Language Learning

Time and Ways of Learning by the Participants Before Enrolling to the English Enhancement Program

Twenty-one (21) of the participants claimed that they have been learning the English language since their primary school and junior middle school. Moreover, two (2) students answered that they just learned during the English course online. Mahmoud Samer (2018) recommended in his study that the students should be continually exposed to the English language e researcher recommended that students should be continually exposed to the English language daily to encourage them to overcome their weaknesses and improve their fluency as well as proficiency in acquiring the English language. Thus, longer exposure to the target language can enhance second language acquisition.

How Students Learned During the English Enhancement Program in Lyceum of the Philippines University

Most of the participants acknowledged that they had positive learning experiences under the English Enhancement Program. Twenty—four participants out of twenty-five responded positively to their learning experience under the program. A few factors that contribute to creating a positive learning environment are establishing a supportive learning culture, addressing a learner's needs, and encouraging a student's involvement in all activities. Also, online classrooms can be made interesting by using informative presentations, engaging activities, and formative assessments. Moreover, there is a teacher factor also in this aspect. Teachers should strive to create an environment that is more conducive to engagement and learning. A learning environment that is not positive and full of restrictions and rigid rules

impairs learning by narrowing a student's focus and inhibiting his/her ability to explore multiple viewpoints and solve problems. A positive learning environment helps improve attention, reduces anxiety, and supports the emotional and behavioral regulation of students.

When educators foster a positive learning culture, learners are more likely to acquire higher motivation which leads to wonderful learning outcomes.

Teaching Strategies of the Professors of the Program

Fifteen (15) participants asserted that they have good learning outcomes based on what they have experienced in the English Enhancement Program. Nine (9) participants focused their answers on the teaching style used by their respective teachers though their inputs were relatively positive on their learning experience. Teaching methods also should vary accordingly. How much a student can learn is also determined by the compatibility of the student's learning styles and the teacher's teaching styles. Therefore, teachers need to know their learners' preferred learning styles because this knowledge will help teachers plan their lessons to match or adapt their teaching and to provide the most appropriate and meaningful activities or tasks to suit a particular learner group at different stages. (Mai Zhou, 2011) Teachers are normally encouraged to use different types of teaching strategies that cater to different students' learning styles and needs (Gozcu & Caganaga, 2016). Understanding students' learning styles helps teachers to choose which types of teaching strategies are suitable for their individual students. However, using different strategies can be very difficult to attain especially with large classes and it is probably more realistic to find a balance, so all students understand the essence of the lesson being taught.

Learning Engagement During the English Program

The majority of the participants, twenty-one (21) in particular, claimed that they had active learning engagement during the English Enhancement Program. They perceived the program as more enjoyable, more meaningful, and more complete. Michel, Cater, and Varela (2009) hold that active learning is a phrase tossed around a great deal today on college campuses and it suggests an approach to classroom instruction in which students engage material through talking, writing, reading, reflecting, or questioning-in other words, through being active.

According to Gong (2003), active learning involves providing opportunities for students to meaningfully talk and listen, write, read, and reflect on the content, ideas, issues, and concerns of an academic subject.

On the other hand, there are four (4) students considered the program a passive one. They are not motivated to speak during the English Enhancement Sessions. This may fall under the theory of Stephen Krashen, Affective Filter. Krashen (1980) claims that learners with high motivation, self-confidence, a good self-image, a low level of anxiety, and extroversion are better equipped for success in second language acquisition. Low motivation, low self-esteem, anxiety, introversion, and inhibition can raise the affective filter and form a mental block that prevents comprehensible input from being used for acquisition. In other words, when the filter is up, it impedes language acquisition. As Figueroa (2019) explained students who exhibit a high affective filter can demonstrate many signs. They tend to feel very self-conscious about their abilities in the new language. Many may experience stress when asked to speak, read, or write in class, and they may have very little faith in their ability to learn. Students report breaking out into a cold sweat, becoming nervous, anxious, and even

surprised when incoherent speech comes out of their mouths since in their head, they understand the concepts. Students with a high affective filter are reluctant to participate in class discussions because they are afraid of making mistakes and being judged by the teacher or other classmates. They would much rather collaborate with classmates in a small group setting, as that allows them to lean heavily on peers for support or avoid work altogether. Boredom is another way that a high affective filter may manifest in a student. Students who don't comprehend what is happening in the classroom may stare into space with a slightly glazed look in their eyes. They are completely disengaged because they have no idea what is going on around them. These students believe that if they don't draw attention to themselves and pretend to know what is going on or demonstrate disinterest, they will be left alone. Thus, the goal of educators is to lower the affective filter so that students feel safe and comfortable and are able to learn.

Furthermore, analysis of the research literature (Xu, 2002), suggests that students must do more than just listen. Students must read, write, discuss, or be engaged in solving problems and most importantly, to be actively involved, and they must engage in such higher-order thinking tasks such as analysis, synthesis, and evaluation.

Usefulness of English Enhancement Program in the Workplace

The role of the English language in career advancement is undeniable in this era of globalization. According to a British Council report (Elizabeth J. Erling,2014), English language skills are extremely rewarded in the labor market. It also emphasizes that skills in English have a constructive impact on economic growth. As the data shows, there are twenty-two (22) participants who gained strength and positive skills to improve their productivity at the workplace. However, there are remaining two (2) participants who find their learnings beneficial in their workplace. And, one (1) participant has the uncertain answer. The study of T. Murugavel and A. Clement (2018), it shows that the necessity of English language skills in the workplace hasn't changed, and the participants have reiterated the role of English as the influencing factor during interviews and at the workplace. This study stressed that the results of the study have revealed that the employees are convinced that English language skills are required for getting a job and performing their responsibilities effectively.

Topics and Skills in English Program That Students Find Challenging

Learning a new language can be difficult, but studying as you are immersed in the language and the culture can make the process a bit easier. These are the most common challenges students face when learning English as a second language. All twelve (12) participants of this study emphasized that speaking is the most challenging skill/topic that they encountered in the English Enhancement Program. They further elaborated it using the various activities done in the programs such as impromptu speeches, question and answer sessions, speech presentations, reporting, and discussions. Next in line, four (4) participants find listening activities challenging. In addition, three (3) participants find the English language structure demanding. Three (3) participants have uncertain answers. The responses of these participants are not related to the question. Two participants find the reading comprehension and analysis difficult for them. One participant claimed viewing skills are challenging too.

Macro Skills That Students Need to Improve More After Taking the English Enhancement Program

Good ability in listening means having the competence to comprehend information during listening activities. However, listening skill is still considered one of the most difficult skills for English language learners although they have been learning English for few years. 16 out of 25 participants highlighted listening skills as the macro skill that they need to improve more. Several factors influenced students' listening skills, limited vocabulary mastery, accent, pronunciation, and lack of practice. Furthermore, their prior knowledge of English structure supported them to be able to figure out some challenges in listening skills. Hence, the students realized the importance of the listening activities, and having good listening skills still appeared as a challenge for most of the participants. Similarly, 15 of the participants noted that their speaking skills need to improve further since they are not mostly exposed to the target language. They find this skill that needs to be enhanced because they believe that the English language is essential for communication.

Moreover, writing and reading are also highlighted by the participants that they need to improve more. The ability to read and write effectively is an important workplace skill across professions and business sectors. In general, writing serves as a core medium for communication and activity in the workplace. Nearly all job postings advertise the so-called soft skills in a job position, frequently detailing descriptions such as strong command in writing skills or "excellent written communication skills" under preferred requirements (Messum et al., 2016).

Problems That Students Encounter While Learning English

English language teaching and learning in non-English speaking countries is a really challenging job. The English language is kept as the subject in school and university curricula and even many schools or universities have adopted English as a medium of instruction in countries where English is used as a second and foreign language, but many students find English a difficult subject to learn (Akbari, 2015; Phyak, 2016).

Seventeen (17) participants claimed that they had linguistic problems while learning English. Since most of them are second-language learners of the English language. Limited vocabulary knowledge limited grammatical knowledge and weaknesses in four language skills are the areas of the English language they find challenging. Akbari (2016) reported some problems in learning English in her research article that are similar to the problems encountered by the participants. She further stated that language learning difficulties may occur due to a lack of understanding of the key role English plays in their life which means motivation plays a vital role in learning a language. If learners are informed about the use of the English language in their lives, then they may be highly motivated to learn the English language. If learners are motivated, then they show their concentration in study and learning becomes faster.

Moreover, four (4) participants have environmental problems due to lack of exposure to the English language. Exposure to language can be defined as the contact that the learners have with the target language that they are attempting to learn. More practice and exposure to the target language are needed by these participants.

Personal problems of the two participants such as language retention and time management are also stated. It is stated that the behavior of the participants in learning the target language is the primary problem such as the motivation in learning the English language and time management. From the above expressions, it can be said that students are unable to develop their language skills due to their behaviors.

Lastly, two (2) participants didn't have any problems encountered while learning the English language.

Recommendations to Further Improve the English Enhancement Program at Lyceum of the Philippines University

Most of the participants suggested the existing Enhancement program be improved based on their concerns and needs. They emphasized the increase in class hours and reduced the number of students per class, language topics, and strategies. These areas must be taken into consideration by the curriculum developer to achieve its objectives in this program more effectively. In contrast, five (5) participants are satisfied with the existing English program of the university.

Conclusions

Based on the results 88% of the respondents considered English as an essential factor of their professional development. The use of the English Language will be also beneficial in their workplace communication, however, some of them find it challenging because of their cultural practices in their own countries.

Based on the TOEIC results majority of the students were able to get the target score required by LPU in their English Proficiency Level on listening and reading examinations.

The English Enhancement Program that they enrolled before the taking examination became helpful for them to reach the target score. The exercises given by their instructors helped the students to become more prepared to take the listening and reading test provided by Hopkins International.

The students were challenged in terms of linguistic capabilities. They need to improve their grammar and vocabulary to be more advanced at the graduate level. The environmental factors like lack of exposure to the language, cultural practices in their country, beliefs in the use of English Languages in their country, and teaching strategies they encountered as the English Language was introduced to them by their former teachers. The readiness of the learners in terms of acquiring the English language is another factor that challenges their ability to learn.

The findings of the study helped the researchers to further improve the program in terms of teaching strategies, classroom management, length of the program (not limited to 10 meetings only), providing remedial sessions for other students, who need more enhancements, giving more engaging activities for further exploration of the macro skills, positive motivation and reinforcement, and provide more exposures on oral and written communication.

Recommendations

To further enhance the effectiveness of the program and the scores of the students in terms of taking international examinations like TOEIC, the researchers recommend the following:

1. Promotion of the English Enhancement Program to other partner universities locally and internationally.
2. Speaking and writing international examinations are recommended aside from the listening and reading tests provided by Hopkins International.
3. Improve the syllabi of the English Enhancement Program considering the needs of the students according to their level.
4. Provide more English Enhancement Classes aside from the 10 preliminary sessions practiced.
5. Determine the other weaknesses of the students in terms of other skills to improve such as vocabulary development, grammar enhancement, listening and reading comprehension, discourse writing techniques, and speaking engagements such as participation in competitions to further motivate their enhancement of skills.
6. Faculty members teaching the program will have more training to further improve their teaching strategies both locally and internationally.
7. Categorize the students according to their level of proficiency after taking a preliminary or diagnostic examination before continuously enrolling in the program of their needs.
8. Exploration of the demographic profile of the students or language learners to further adjust to their needs with the means of preliminary interviews.
9. Recommendation to more face-to-face interaction with their instructors than online classes.
10. Benchmarking to other universities on their English Enhancement Practices.

Acknowledgment

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Bridging Asynchronicity and Engagement: Data-Driven Insights Into Flipped Learning

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Abstract

Advocates of flipped and blended learning have reported on how these models encourage students to actively engage and become agents in their own learning. There is, however, limited evidence on the extent to which asynchronous online learning materials developed for flipped learning programmes support students to actively engage in their learning. Using back-end data analytics, this study aims to demonstrate the behaviour patterns exhibited by students in a programme where 30% of the flipped learning curriculum design is delivered asynchronously online. A cross-sectional case study research design within a quantitative framework was used. Online content used to teach foundational year students (n=3957) English for Academic Purposes at a British-Asian university in China was analysed. This included teacher-generated videos, comprehension quizzes, and activities linked to subsequent in-person sessions. A prominent finding of this study is that students do in fact take advantage of the unrestricted access to online materials, although overall asynchronous student engagement still needs in-class teacher action to be supported. In summary, data-led investigations into students' online behaviour can advance the pedagogical design and underpinnings of flipped learning along with enhancing educators' adeptness in navigating blended learning environments.

Keywords: EAP, EMI, VLE, Data Tracking, Learning Analytics

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Introduction

Blended learning, an instructional methodology merging conventional in-person teaching with online educational components, has entrenched itself as a ubiquitous feature of contemporary higher education. Evidently, the pervasiveness of this approach is exemplified by the fact that 98% of U.K. universities embraced blended or hybrid learning courses by 2020 (Stacey, 2020). Within the context of the School of Languages (SOL) at Xi'an Jiaotong-Liverpool University (XJTLU), a discernible shift toward the adoption of blended learning has emerged, notably accentuated after the successful pivot to online education amidst the COVID-19 pandemic. This inclination became particularly conspicuous during the 2021/2022 iteration of the Year 1 English for Academic Purposes (EAP) modules, where a delivery model integrated approximately 3 hours per week of self-directed asynchronous online tasks with 6 hours of face-to-face learning. This deliberate hybrid approach aimed to optimize learning outcomes by synergizing traditional classroom experiences with innovative online pedagogy.

Moreover, the increasing internationalization of higher education in China has spurred the rapid expansion of English as a medium of instruction (EMI) institutions and programs, recognizing the critical need for bilingual teaching (Gill & Kirkpatrick, 2013) in order to prepare students for a globalized economy. XJTLU stands as an exemplar of this trend, operating as a transnational institution emphasizing bilingual teaching methodologies. The strategic integration of EAP courses within EMI universities in China, like XJTLU, reflects the recognition of the vital role EAP plays in equipping students with academic English language proficiency. This strategic inclusion is essential in enabling students to navigate academic conventions within specific disciplines, thereby enhancing their preparedness for international exchanges and bolstering their prospects in the global job market (Gao & Bartlett, 2014; Sun & Xu, 2012).

Furthermore, the evolution of education delivery in response to globalization has ushered in a paradigm shift toward virtual learning environments (VLEs) and English-medium instruction. VLEs encompass a spectrum of instructional methodologies that intertwine traditional pedagogical practices with innovative digital tools and asynchronous learning platforms (Smith et al., 2022). As institutions like XJTLU increasingly embrace these digital landscapes, the treasure trove of data generated by student interactions within these environments holds immense promise. By leveraging modern data tracking and analytics tools, educators gain invaluable insights into students' engagement levels, learning preferences, and utilization patterns within these dynamic learning ecosystems (Podgorelec & Kuhar, 2011). This transformative capability not only empowers course designers and instructors to tailor educational materials more effectively but also to optimize student learning experiences within the complex context of virtual education (Huggins-Manley et al., 2019; Smith et al., 2022).

Recognizing the potentially transformational role of data analytics in shaping contemporary educational paradigms, this paper embarks on a comprehensive exploration into the intricate landscape of data tracking within the context of XJTLU's blended learning environments and English-medium instruction. The increasing emphasis on VLE and the integration of EAP into curricular frameworks necessitates authentic case analyses of how data tracking mechanisms can be harnessed to optimize student learning experiences. Consequently, this study aims to utilize data tracking methodologies to investigate the dynamics of asynchronous educational delivery within XJTLU's context, aiming to elucidate its impact on

enhancing pedagogical strategies, facilitating student engagement, and fortifying the efficacy of later EMI learning.

Literature Review

Asynchronous EAP Learning Environments

In asynchronous EAP learning environments, various instructional methods are employed to facilitate language acquisition and academic skill development. These approaches often encompass multimedia resources, interactive activities, and self-paced modules (Gill & Kirkpatrick, 2013). Multimedia resources, such as videos, recorded lectures, and authentic materials like TED Talks, are frequently utilized to expose students to real-life language use and enhance their engagement (Sun & Xu, 2012). These resources serve to simulate authentic academic contexts, enabling students to comprehend academic conventions while improving language proficiency (Hadijah & Shalawati, 2021).

Furthermore, asynchronous EAP courses incorporate interactive activities like online discussions, forums, and collaborative tasks, aiming to foster communication skills and critical thinking within a virtual academic community (Gao & Bartlett, 2014). These activities often encourage student participation, facilitating language practice and creating opportunities for peer learning (Alves, 2015). The diverse array of instructional methods in asynchronous EAP learning environments caters to various learning styles and promotes autonomous learning experiences among students (Gao & Bartlett, 2014). Through these methods, students gain exposure to authentic academic language, engage in interactive learning activities, and develop crucial language and academic skills necessary for their academic journey.

Exemplar Videos

Exemplar videos can play a valuable role in the instructional design of EAP courses, offering diverse and comprehensive resources to enhance language learning. These videos serve as models for effective presentations, language use, and academic discourse, aiming to acquaint students with the common features of academic language and communication. TED Talks and authentic video materials often form the basis of these exemplar videos (Achaleke, 2021). They are carefully selected to illustrate essential presentation elements, storytelling techniques, effective use of signposting language, and appropriate integration of visuals and text (Shalawati et al., 2021).

Through these exemplar videos, students not only gain exposure to natural language use but also witness effective communication strategies demonstrated by expert speakers (Achaleke, 2021). The deliberate selection of videos aligned with specific course objectives aids in reinforcing academic skills while fostering an understanding of diverse communication styles and contexts (Wang, 2014). Exemplar videos are strategically integrated into the curriculum, encouraging students to analyse and emulate effective communication patterns and presentation techniques in their own academic endeavours. By engaging with these exemplars, students gain valuable insights into authentic academic communication, which in turn enhances their proficiency and confidence in using academic language (Hadijah & Shalawati, 2021). These videos serve as powerful pedagogical tools, providing tangible examples that aid in the development of students' language and presentation skills within the EAP context."

Instructional Videos and Student Engagement

Instructional videos within EAP courses serve as dynamic resources, fostering heightened student engagement and interaction with course content. Chen and Wu (2015) highlighted the efficacy of video lectures and screencasts in facilitating learning by offering visual and auditory stimuli that cater to diverse learning preferences. These videos not only present course material but also provide a personalized learning experience (Lowenthal, 2021). Lyons et al. (2012) noted that the inclusion of talking head presentations alongside slide presentations exhibited no significant difference in learning performance but showcased preferences among students for the instructor's face presence.

The flexibility of instructional videos in accommodating varied learning paces and preferences augments student control over their learning (Cohen, 2022). Students benefit from the convenience of accessing pre-recorded videos, allowing them to revisit and review materials as needed, fostering a sense of agency through pause, play, and rewind functionalities (Cohen, 2022). However, the effectiveness of these videos depends not only on their content but also on their relevance and context to the audience. Wood et al. (2020) emphasized that purpose-developed recorded videos specifically tailored for online students significantly enhanced their learning experience compared to repurposed lecture captures.

Furthermore, the integration of instructional videos aligns with contemporary student learning behaviours, promoting active participation and creativity (Boisvert, 2015; Stone, 2019). Digital video projects and online videos have been found to not only improve speaking abilities but also encourage creativity and diverse modes of expression (Boisvert, 2015; Jati, Saukah, & Suryati, 2019). These findings underscore the value of instructional videos in engaging students within the EAP context, providing a multifaceted approach to language learning and fostering active student involvement.

Data Tracking in VLEs

The significance of data tracking within VLEs cannot be overstated in the context of EAP. VLEs serve as expansive repositories of student interactions, offering a wealth of data that, when appropriately analysed, can yield profound insights into student learning behaviours, preferences, and needs (Hardy et al., 2004). The data generated within VLEs encompass a broad spectrum, ranging from user engagement metrics, time spent on specific tasks, to patterns in resource utilization (Huggins-Manley et al., 2019).

Through data tracking and analysis, educators can gain information of how students interact with course materials. Alves (2015) and Kuzilek et al. (2018) emphasized the pivotal role of tracking student activities within VLEs, enabling educators to model student dropout rates and monitor performance trends. Podgorelec & Kuhar (2011) extended this by highlighting the potential for advanced data analysis within VLEs to monitor student performance comprehensively.

Moreover, the use of data mining techniques within VLEs has shown promise in identifying not just the engagement levels but also learning patterns and misconceptions among students (Podgorelec & Kuhar, 2011). This information equips educators with the insights needed to tailor instructional strategies, identify areas requiring additional support, and even predict student outcomes.

Research Questions

Given the multifaceted potential of data tracking within VLEs in optimizing EAP course delivery, this study aims to use data tracking methods within the context of Year 1 EAP at XJTLU to investigate student engagement with the provided asynchronous materials. To narrow our focus and harness the insights gleaned from data tracking methodologies, the following research questions are posed:

1. How does data tracking provided by Moodle provide insight into student engagement with asynchronous learning materials?
2. What specific insights can be gained from student engagement data in XJTLU's Y1 EAP context?

Methodology

Student Numbers/Characteristics

The study was conducted on a Year 1 Undergraduate EAP module with 3,957 students during semester 2. The course was mandatory for all Y1 students and the required course exit was CEFR Low B2. Learning outcomes cover all four macro skills listening, reading, speaking and writing and it is taught across three 100-minute sessions a week in smaller groups up to 27 students.

Asynchronous VLE Design Approach

The module of this size requires a large number of EAP lecturers and due to COVID-19 pandemic, it was challenging to provide the required number of staff to support the delivery. The number of full-load lecturers needed to teach on the module had to be reduced from 80 to 53. The decision was made to create a blended curriculum with two independent, online asynchronous lessons per week to reduce the strain on staffing.

The structure of the Integrated Syllabus

The weekly lesson structure comprised two online lessons (D1: 80-100 minutes and D4: 50 minutes) and three 100-minute onsite lessons. Online lessons introduced a particular skill with set homework and onsite lessons served as reinforcement and skills practice. The weekly structure can be seen in Figure 1 below.
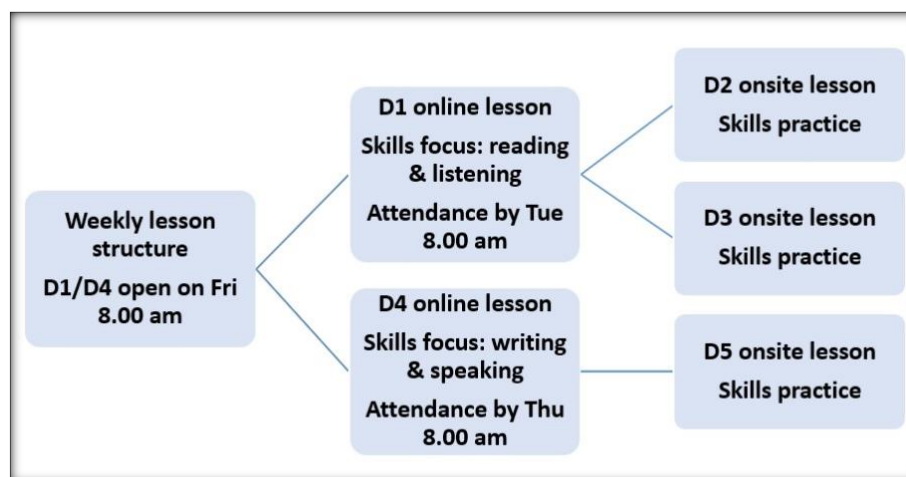
Figure 1: Weekly Lesson Structure

Individual online lessons consisted of an instructional video introducing a skill with lecturer face and subtitles, a video comprehension quiz, and 1-2 practice quizzes depending on the number of individual skills practised. Each lesson was rounded off with a homework task sheet – usually a writing or a speaking preparation assessed in the corresponding synchronous class.

A Moodle attendance plugin was used to automatically take attendance for asynchronous lessons upon completion. A number of activity completion restrictions were used to ensure students only got attendance if they completed a whole lesson. For example, a student would only have access to the following activity if the previous one was completed. In case of Moodle quizzes, the completion requirement was 40% accuracy in responses to questions.

Data Tracking Approach

The lesson completion and student engagement were consistently tracked on weekly basis throughout the semester via Moodle analytics through several aspects. First, completion reports were generated for timely lesson completion within given timelines for attendance purposes. Secondly, another set of the reports were generated monitoring general student engagement with online content. Further, individual activity completion reports were generated for each week to gain insight into the completion trends within the individual asynchronous lessons. Over the course of the semester, the reports were used to monitor students' engagement and performance, and to follow up with the students with low performance. At the end of the semester all the data provided by Moodle was analysed and studied.

Results

The learning analytics revealed, contrary to a predisposed belief, that students' motivation for completing online lessons was not solely driven by getting attendance marked for the lessons. It can be seen in Figure 2 that the completion rate continued increasing after the attendance deadline had passed. Further, the graphs show that the student completion rate was higher for D1 than for D4 lessons. This was surprising considering that D4 lessons were shorter.

Figure 2: Lesson Completion Reports for W4 – 14

Next, we investigated the individual lessons to gauge whether the students were completing whole lessons and, as it can be seen in Figure 3, this was mostly not the case. Students tended to watch the instructional video, but they would not necessarily complete the follow up activities.
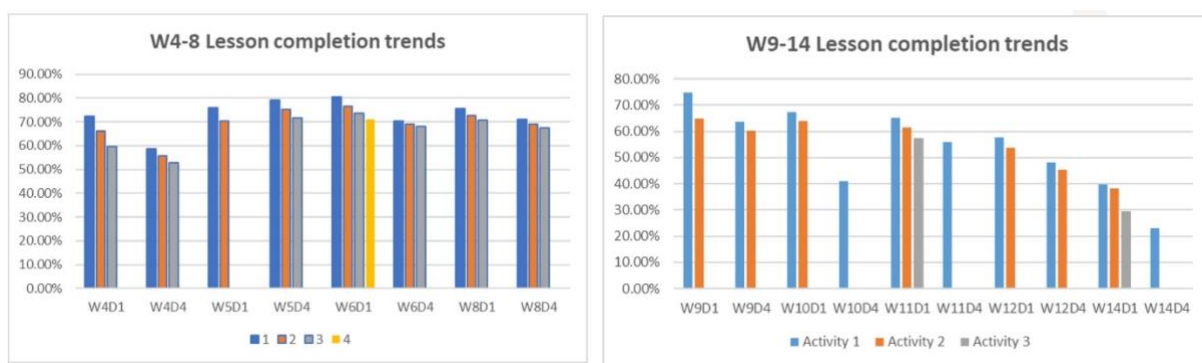
Figure 3: Individual Activity Completion Trends

Given the results above which indicated that the students were more likely to engage with instructional videos, we wanted to look at how students engage with the video content. Since all the video content was uploaded to Moodle via MediaSite, their analytical tools were used to look at video viewing trends. For the purposes of this study, one video was chosen to study the viewing trends namely one of the three provided model presentations which served as a preparation for assessed speaking coursework. MediaSite analytics offered comprehensive data for viewed video content.

MediaSite analytics clearly showed that the video showing the model presentation was viewed 15,794 times by 2,257 students over the semester. This equalled to over 324 hours of viewing for a video of 5 min and 22 seconds.

Total views: S2 AY21/22	15,794
Total time watched	324:29:19
Video duration	5:22
No. of users	2,257

Table 1: Model Presentation Video Views

Further, we looked at the data showing which video segments were most frequently viewed and the number of the times individual students watched the video. See Figure 5 below.

TOTAL VIEWS PER LENGTH

VIEWING TRENDS: S2 AY21/22
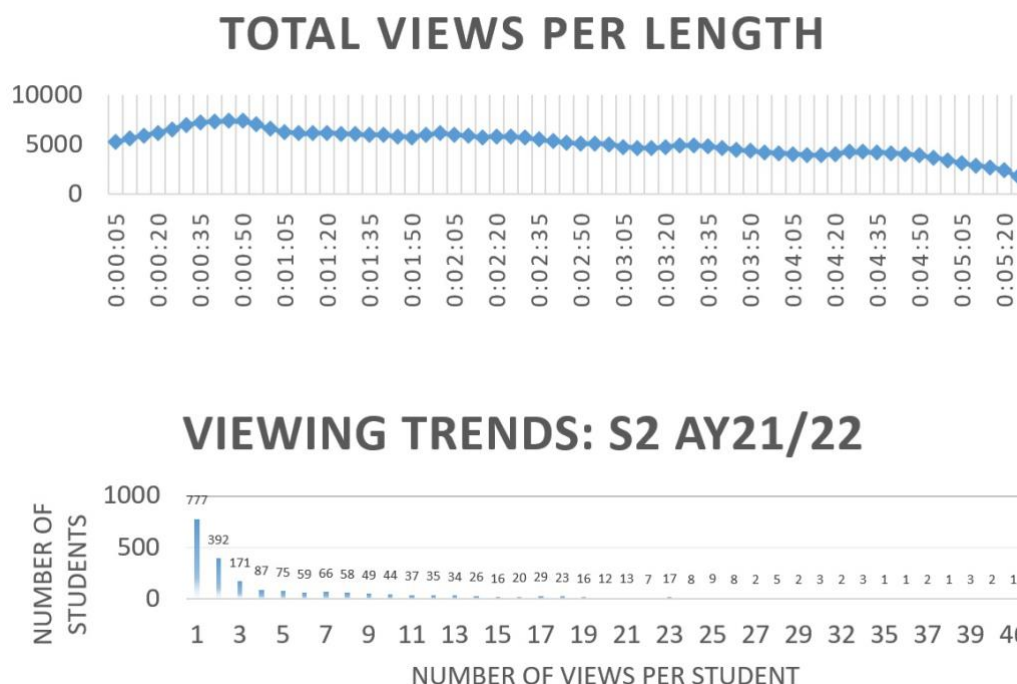
Figure 4: Viewing Trends of the Model Presentation

Finally, one representative student was chosen who viewed the video 23 times and the student's engagement with the video across the semester was analysed. The data was extracted from MediaSite analytics from the student's access logs. The Table 1 below shows the duration and the instances of watching the video in relation to key assessment dates during the semester.

Week	Access date/time	Time spent watching	Key dates
W1	2/21/22 12:04 AM	10:44	Sample presentation available
W1	2/24/22 11:08 PM	05:22	
W7	4/9/22 2:46 AM	03:02	Reading week
W7	4/9/22 3:22 AM	00:31	Formative SCW task sheet released in W6
W7	4/9/22 3:50 AM	05:08	
W7	4/9/22 11:01 PM	02:32	
W7	4/9/22 11:32 PM	01:29	
W7	4/10/22 11:06 PM	01:22	
W8	4/13/22 12:57 AM	12:22	Formative SCW delivery
W8	4/13/22 9:02 PM	14:19	
W10	4/25/22 11:23 PM	00:53	Summative SCW task sheet released
W10	4/27/22 10:08 PM	00:08	
W10	4/28/22 9:52 PM	05:22	
W10	4/29/22 1:00 PM	00:04	
W10	4/29/22 1:24 PM	00:05	
W11	5/3/22 7:57 PM	00:02	
W11	5/3/22 8:17 PM	00:08	
W11	5/3/22 11:43 PM	00:34	
W11	5/4/22 11:27 PM	00:01	
W11	5/4/22 11:30 PM	00:02	
W11	5/8/22 10:39 PM	02:35	
W12	5/9/22 12:37 AM	12:07	Summative SCW rehearsal
W13	5/15/22 10:16 PM	12:34	Assessment week
Total	23	1:31:26	

Table 2: Student's Viewing Logs

Discussion

VLEs and Asynchronous Learning Design

The integration of blended learning strategies within EAP courses at XJTLU reflects an evolution responding to the global shift towards VLEs and bilingual instruction (Gill & Kirkpatrick, 2013). Asynchronous EAP learning environments, enriched with multimedia resources and interactive activities (Sun & Xu, 2012), have proven instrumental in nurturing language skills and academic competence among students (Hadijah & Shalawati, 2021). This aligns with the paradigm shift towards digital landscapes in education, underscoring the importance of incorporating innovative pedagogical tools such as exemplar videos (Achaleke, 2021; Shalawati et al., 2021).

The strategic incorporation of exemplar videos into EAP modules in the Year 1 EAP course at XJTLU signifies an intentional effort to immerse students in authentic academic discourse and presentation styles (Achaleke, 2021). These videos serve as models for effective communication, offering tangible examples of academic language use and presentation techniques (Hadijah & Shalawati, 2021). Furthermore, instructional videos within EAP courses have redefined the learning experience, catering to diverse learning preferences and enhancing student engagement (Chen & Wu, 2015; Lyons et al., 2012). The adaptability of these videos allows students to control their learning pace, fostering active participation and creativity (Boisvert & Rao, 2015; Cohen, 2022).

VLEs and Data Tracking

The transformative potential of VLEs lies not only in their instructional methodologies but also in the wealth of data they generate (Hardy et al., 2004). Data tracking within VLEs, as highlighted by Alves (2015) and Kuzilek et al. (2018), offers invaluable insights into student engagement patterns and performance trends. The comprehensive data analytics facilitated by VLEs enable educators to tailor instructional strategies, predict student outcomes, and identify areas requiring additional support ((Podgorelec & Kuhar, 2011). This resonates deeply with our study's findings regarding the utilization of Moodle analytics to track student engagement within asynchronous EAP lessons.

The data tracking analysis conducted during this study revealed intriguing patterns in student engagement with asynchronous learning materials at XJTLU. Contrary to initial assumptions, students' motivation for lesson completion extended beyond mere attendance marking, evidenced by increasing completion rates post-attendance deadlines (Figure 2). However, an interesting disparity emerged between completion rates for different lessons (Figure 2), indicating a complex engagement pattern that warrants further exploration.

Our study also investigated the depth of student engagement with instructional videos, particularly a model presentation video critical for an assessed speaking coursework. MediaSite analytics provided rich data reflecting extensive viewership and varied patterns of video segment engagement (Figure 5). Notably, one student's comprehensive engagement with the model presentation video, viewing it 23 times, revealed a deep immersion strategy evident around key assessment dates (Table 1).

These findings underscore the complexity of student engagement within asynchronous EAP learning environments and emphasize the multifaceted nature of data tracking within VLEs.

They reaffirm the potential for data analytics to illuminate pathways for enhancing pedagogical strategies and optimizing student learning experiences (Podgorelec & Kuhar, 2011). However, they also highlight the necessity for a more holistic understanding of student engagement patterns to inform future instructional design and interventions effectively, which could be achieved by qualitative and quantitative research methods informed by data tracking based research.

In light of these findings, the research questions posed in this study lay a solid foundation for future investigations into the intricacies of data tracking within VLEs, particularly within the context of EAP at XJTLU. Through the use of data tracking, the complexities of student engagement and learning behaviours within these digital landscapes may be begun to be unravelled, and educators can further refine their pedagogical approaches and harness data-driven insights to foster optimal learning experiences.

Conclusion

The exploration into data tracking within XJTLU's EAP modules within VLEs has unearthed valuable insights into student engagement and learning behaviours. The findings underscore the transformative potential of leveraging data analytics to optimize pedagogical strategies and enhance student learning experiences.

Key Recommendations

Enhanced Understanding of Engagement Patterns: Further studies should investigate further qualitatively into the nature of student engagement within asynchronous EAP lessons. This includes exploring varied completion rates across different lessons and deciphering the motivations driving engagement beyond mandatory attendance marking.

Fine-Tuning Instructional Video Integration: Educators can refine instructional video strategies by studying viewer engagement patterns more comprehensively. Tailoring video content and structure to align with students' learning behaviours and key assessment dates can enhance their efficacy.

Holistic Approach to Data Tracking: Implementing a holistic approach to data tracking within VLEs, beyond lesson completion rates, can provide further insights into student learning behaviours. Exploring additional metrics and engagement indicators can enrich the insights gained from analytics.

Limitations

Scope and Generalisation: This study focuses on a specific EAP module at XJTLU, limiting the generalizability of findings to other contexts. Future studies across diverse modules and institutions could provide a broader perspective.

Technical Constraints: The study relies on data generated by Moodle analytics and MediaSite tools, which might have inherent limitations in capturing certain aspects of student engagement and learning behaviours.

Contextual Specificity: The nature of student engagement within asynchronous EAP environments may be influenced by context-specific factors, such as cultural backgrounds or prior educational experiences, which this study does not extensively cover.

In conclusion, while this study provides valuable insights into data tracking within VLEs and its impact on student engagement within the EAP context, it also highlights the need for continued exploration and refinement. By embracing data-driven insights and refining instructional methodologies based on observed engagement patterns, educators at XJTLU and beyond can further optimize the delivery of EAP courses and enhance student learning outcomes.

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Digital Teaching Aid Development to Answer Challenges in Learning Quadratic Equation in Indonesia

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Abstract

Quadratic equation is considered as the most challenging mathematics topic for secondary high school students in various countries, including Indonesia. Studies have been done to identify challenges in the teaching and learning of this topic. The three most common challenges discovered include dull teaching method that does not encourage active learning, difficulty in obtaining conceptual understanding on quadratic equations and its associated information, and difficulty in interrelating different solution methods, including the factor form, vertex form and graphical representation. Teaching aid in the form of digital technologies is commonly proposed to address these challenges. However, existing media may not fully address all the discovered challenges. Moreover, digital media adds additional challenges in the form of various distractions that can hinder students' focus in learning the material. Therefore, this paper discusses the development of a digital teaching aid that is specifically designed to help learn quadratic equations by mapping challenges to features of the digital media. As a result, an offline computer software has been developed with the following five features: it supports both English and Bahasa Indonesia, it has well-defined input mechanisms for ease of use, it is able to generate graph automatically from a given quadratic equation and highlight it with associated information of the equation, it has an "Exercise" menu with a simple game to maintain students' interest, and it has three "Form" menu to interrelate various forms of a quadratic equation complete with sliders to experiment with coefficients of a quadratic equation.

Keywords: Educational Software, Teaching Aid Development, Digital Media, Quadratic Equation

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Introduction

As a subject that is used in various disciplines (Kim How et al., 2022), particularly in science, technology, and engineering (Reid O'Connor & Norton, 2022), mathematics is commonly considered as a compulsory subject for secondary school in various countries. In Indonesia, mathematics is not only a compulsory subject, but also the subject with the most study hours (Anggraini & Kartini, 2020). However, even with this much emphasis on mathematics, many students still find it to be a difficult and terrifying subject (Anggraini & Kartini, 2020; Fatoni et al., 2017; Tanu Wijaya et al., 2020). One topic that proves to be a challenge for secondary school students is algebra, which may be caused by its abstract nature (How et al., 2022). Students struggle to understand the concept of variables and how to solve equations with variables. Evidence can be seen from various research that showed algebraic mistakes made by students in solving related problems (Kim How et al., 2022; López et al., 2016; Reid O'Connor & Norton, 2022; Vaiyavutjamai & Ken Clements, 2006; Zakiyah et al., 2021). This problem needs to be addressed since algebra is one of the main components in mathematics and is considered as a key requirement to enter higher education (How et al., 2022). This becomes a concern since the difficulty in learning basic mathematics in junior secondary years may in turn reduce the number of students learning advanced mathematics subjects in later years (Reid O'Connor & Norton, 2022). Not having the necessary human resources will eventually hinder the development of science, technology, and engineering.

Among all algebraic topics taught in secondary school, quadratic equation is considered as the most challenging (Kim How et al., 2022). Various research has been conducted on the topic of quadratic equation in various countries, such as Australia (Reid O'Connor & Norton, 2022), Thailand (Vaiyavutjamai & Ken Clements, 2006), Puerto Rico (López et al., 2016), Malaysia (How et al., 2022; Kim How et al., 2022), America (Faghihi et al., 2017), and Indonesia (Anggraini & Kartini, 2020; Fatoni et al., 2017; Hidayah, 2020; Zakiyah et al., 2021). The recurring topic among the research is the difficulty faced by students and teachers in teaching and learning quadratic equations. Some difficulties that were repeatedly found are students' understanding of the concept of quadratic equation, the concept of a solution to a quadratic equation, and the various forms of quadratic equation. It is noteworthy that these difficulties persist over time, as evidenced by the same finding from research in 2006 (Vaiyavutjamai & Ken Clements, 2006) and in 2022 (Reid O'Connor & Norton, 2022). This is of high concern because quadratic equation is widely used in real-life situations and other disciplines, is helpful in establishing a connection among mathematical topics (How et al., 2022; Kim How et al., 2022), and is fundamental in understanding advance topics in mathematics (López et al., 2016; Reid O'Connor & Norton, 2022). Failing to understand basic mathematics concepts, such as quadratic equation, has long-term effects that can lead to misconceptions in other topics since topics in mathematics are interrelated (How et al., 2022).

One potential solution believed to help students learn quadratic equation is the utilization of technology (Vaiyavutjamai & Ken Clements, 2006). In fact, the use of various forms of digital technologies in mathematics education has been proven to be beneficial (Alabdulaziz, 2021). Some of the benefits include facilitating experimentation and increasing motivation in learning mathematics. The need of a teaching aid in quadratic equation has also been proposed in various recent research (Fatoni et al., 2017; How et al., 2022; Kim How et al., 2022; Vaiyavutjamai & Ken Clements, 2006). To answer this need, this paper discusses the development of a digital teaching aid in the form of computer software to help teaching and learning of quadratic equations. The resulting digital media provides a way for students to face common difficulties in understanding quadratic equations and grasping the meaning

behind each coefficient in various forms of quadratic equations through graphical representation. Thus, students can observe and experience the effect of each coefficient in a quadratic equation.

The remainder of this paper is organized as follows. Chapter II discusses previous research on the teaching and learning of quadratic equations in various countries. Challenges found in previous research are then listed and mapped to the requirements of the software in Chapter III. The resulting software is discussed and shown in Chapter IV. Chapter V contains concluding remarks.

Literature Review

Study on the teaching and learning of quadratic equations has long been conducted. In 2006, a study with 231 Grade 9 students in two government secondary schools in the Chiang Mai Province in Thailand was conducted (Vaiyavutjamai & Ken Clements, 2006). The teaching method used was the traditional teaching approach where teachers act as the primary source of information while students listen and follow given instructions. This approach was commonly used in many countries at that time. After analyzing the test results of 231 students along with the transcripts of interviews with 18 selected students, it was found that most students have problems in conceptual understanding of quadratic equations, especially on the notion of variables and solutions of a quadratic equation. The writers suggested the use of modern technology to help students in learning the material, particularly one that can generate graph of a function and pinpoint the important information of that function.

Various other studies have also been performed in more recent years in various countries. In Australia, a study was carried out with 25 Year 11 students from a coeducational high school in Queensland (Reid O'Connor & Norton, 2022). Written tests and diagnostic interviews were used to discover students' lack of conceptual understanding and problem-solving abilities. The challenges found were summarized into four main topics, which are the null factor law, nature of quadratics, algebraic conventions, and solving techniques. It is important to note that the same mistakes were made by students in this research and the previous one. Similar problems were found in another study conducted in Puerto Rico with eight beginning college students and 121 science and engineering student who took multivariable calculus course (López et al., 2016). Students in the study failed to understand the meaning of solutions of quadratic equations and the relationship between different solution methods for quadratic equations.

In line with the previous studies, some studies in Indonesia observed similar problems (Anggraini & Kartini, 2020; Hidayah, 2020; Zakiyah et al., 2021). The three studies conducted in three different cities in Indonesia found common difficulty faced by students in learning quadratic equations, that is interrelating different forms of quadratic equations to find solutions, both in factor and vertex forms. Moreover, two of the studies confirmed (Hidayah, 2020; Zakiyah et al., 2021) that students in their study had a hard time understanding conceptually the meaning of quadratic equations and their solutions. It is noteworthy that traditional teacher-centered approach is still widely used in Indonesia (Fatoni et al., 2017; Lan et al., 2021), which might also be the reason for the lack of conceptual understanding due to overemphasis on procedural knowledge in symbol manipulation, as suggested in (Reid O'Connor & Norton, 2022; Vaiyavutjamai & Ken Clements, 2006). The problem of teacher-centered approach was also observed in a study with 38 Grade 8 students in Jember, East Java (Fatoni et al., 2017). The authors commented on teacher-centred

approach that does not encourage students to be actively engaged in learning as the reason why students perceived mathematics subject as difficult. They proposed to use simple and exciting teaching and learning media to increase students' motivation in learning mathematics. This reasoning was also supported by another study with 10 Grade 9 students in Bangkinang, Riau (Anggraini & Kartini, 2020). In one study on gamification of statistical material, the use of interesting teaching and learning media increased students' engagement and motivations, which in turn resulted in better comprehension of the material (Rembulan & Putra, 2018).

Previous research already hinted on the use of digital technologies to help the teaching and learning of quadratic equations. In general, the utilization of digital tools to improve mathematics and science learning have been discussed and proven (Hillmayr et al., 2020). The study concluded that secondary school students who were taught using digital tools in science or mathematics classes had significantly more positive attitudes toward the subjects than their counterparts. Another study had also investigated the benefits of using various forms of digital technologies in mathematics education (Alabdulaziz, 2021). The author interviewed 120 mathematics teachers and found some benefits. Some notable ones are its potential to motivate and excite students by making mathematics more interesting and meaningful, improve learning, facilitate active learning through experimentation that enable students to better relate functions to graphs, encourage students to learn more, and provide in-depth learning strategy.

In the teaching and learning of quadratic equations, few research have been done to investigate the benefits of using digital media. Hawgent dynamic mathematic software was used to teach quadratic equations in (Tanu Wijaya et al., 2020). According to the research, students who were taught using the software were able to visualize and generalize the graphical form of a quadratic equation more effectively than those who were taught using traditional methods. However, the majority of the Hawgent dynamic mathematics software materials were still written in Chinese, which makes it less suitable to be used globally, particularly in Indonesia.

Another form of digital media was developed in the form of a game in (Faghihi et al., 2017). The study pointed out lower anxiety levels for adult participants who played the game compared to others who just waited before they were asked to solve a quadratic equation problem. However, the game itself did not have elements that could help students relate different solving methods, especially between a function and its associated graph. Moreover, an observation by (How et al., 2022) indicated that secondary school students are easily distracted with irrelevant elements on a digital media, which commonly exist in a game to build an exciting gaming environment.

Another approach was used in (Fatoni et al., 2017) that integrated GeoGebra to an online learning platform in Indonesia called KelasKita. GeoGebra is an online computer algebra system (CAS) that can help learn mathematics for all levels of education, while KelasKita is an online learning platform where teachers can interact with students through various features, such as forum, quiz, chat, etc. The study showed that the resulting online digital media was deemed interesting and motivating by the students. The author also verified the effectiveness of the media by showing that 89.5% of the students successfully passed the minimum required score for a test in quadratic equations. However, GeoGebra is an online CAS that is not specifically intended for learning quadratic equations. There are a lot more features for other topics that can be accessed and experimented with on GeoGebra, which may become a

distraction for students. This is in line with another observation by (How et al., 2022) that indicated secondary school students are easily side-tracked when they browse through online learning media, particularly YouTube. Another consideration is the availability of internet connection in developing countries, as observed in (How et al., 2022). Moreover, there is no readily available feature that can interrelate various forms of quadratic equations, particularly the factor and vertex forms.

Although digital media has been generally accepted as a teaching aid that can help students in learning mathematics, only a few research has attempted to develop one that can specifically address previously studied challenges in learning quadratic equations. In addition, the use of digital media to help teach mathematics is not a common practice in developing countries (Tanu Wijaya et al., 2020), including Indonesia. Therefore, this paper discusses the development of digital media with features that specifically mapped the challenges that have been identified from previous research. The research question that will be covered in this paper is how to develop a digital teaching aid that could help students face common challenges in comprehending quadratic equations.

Teaching Aid Design

Based on previous studies, the three most common problems in the teaching and learning of quadratic equations are the lack of conceptual understanding (Hidayah, 2020; How et al., 2022; Kim How et al., 2022; López et al., 2016; Reid O'Connor & Norton, 2022; Vaiyavutjamai & Ken Clements, 2006), the lack of ability to build connections among different solution methods (Anggraini & Kartini, 2020; Hidayah, 2020; López et al., 2016; Reid O'Connor & Norton, 2022; Zakiyah et al., 2021), and the use of dull teaching methods (Anggraini & Kartini, 2020; Kim How et al., 2022; Vaiyavutjamai & Ken Clements, 2006). Moreover, two additional problems from using digital media in developing countries need to be considered, which are students' limitation in accessing internet and resources in their language, and also and their tendency to get easily distracted and side-tracked with irrelevant contents (How et al., 2022). These problems are summarized and mapped to requirements in Table 1.

Conceptual understanding is defined as knowing both what to do and why as opposed to procedural understanding that is loosely defined as rules without reason (Vaiyavutjamai & Ken Clements, 2006). In terms of quadratic equations, misconceptions can occur on the concept of variables, solutions, and roots. Many students find difficulties in explaining the meaning of each component in the quadratic equation (Reid O'Connor & Norton, 2022; Vaiyavutjamai & Ken Clements, 2006). They may be able to solve the equation without understanding the meaning of their solution. In addition, these students may not be able to associate the equation with the graph as suggested in (López et al., 2016). Solving a quadratic equation and representing it in a graph are two sides of the same coin. Therefore, it is crucial to provide both equations and their graph simultaneously. Moreover, important information, which is intercepts and the extreme point, needs to be highlighted to help students in realizing the meaning of those.

Quadratic equations can be represented in various forms, such as standard form, factor form, vertex form, and graphical representation.

$$\text{standard form} \quad : \quad y = ax^2 + bx + c,$$
$$\text{factor form} \quad : \quad y = a(x - x_1)(x - x_2),$$
$$\text{vertex form} \quad : \quad y = a(x - x_v)^2 + y_v.$$

Each form emphasize different important information, and thus it is important for students to become familiar with each form and to identify which form is best for their needs. However, as evidenced in (López et al., 2016), students often find it difficult to express quadratic equations in factor or vertex form. Consequently, students tend to use inefficient procedures to obtain the required information that should be easily seen when students use the appropriate form. In addition, notice that each form has a different set of coefficients, which may cause confusion in relating the forms. To address these problems, the teaching aid should provide a way to represent a quadratic equation in those four forms as well as to display the relationships between coefficients in other forms. This requirement is consistent with the findings in (How et al., 2022; López et al., 2016) that suggested students should be able to explore alternative answers to improve their understanding of quadratic equations.

Teaching methods have a significant influence on students' comprehension, as supported by earlier findings. The use of teaching approaches that focus on procedural knowledge leads to students overlooking conceptual understanding (Reid O'Connor & Norton, 2022; Vaiyavutjamai & Ken Clements, 2006), which has been discussed in the previous paragraph. Another finding from (Anggraini & Kartini, 2020; Fatoni et al., 2017; Kim How et al., 2022) stated that dull teaching method that heavily stressed on teacher's explanation caused students to become passive and unmotivated. This needs to be addressed since (Alabdulaziz, 2021; Rembulan & Putra, 2018) have shown positive relationship between students' motivation and their comprehension. Hence, it is imperative that the teaching aid must be interesting and interactive to encourage students to actively experiment and explore the material.

Although the use of digital media in teaching mathematics has been proven to be beneficial, a study by (How et al., 2022) observed some drawbacks in the form of accessibility and distractions. The study mentioned students' difficulty in accessing the internet at home for self-study, which is also a common problem in Indonesia. Even after having Internet access, students faced difficulties in finding the right resources that match their linguistic ability. Another problem discovered is students' tendency to get easily distracted and side-tracked with irrelevant content, either other online content or elements in the digital media itself. To overcome these problems, an offline digital media needs to provide both English and Bahasa Indonesia. Moreover, to minimize distraction, the interface should be simple and intuitive. Ease of use has been suggested to increase students' motivation to learn (Fatoni et al., 2017).

Challenges	Requirements	Additional References
Inability to obtain conceptual understanding.	A mechanism to visualize a quadratic equation into graph complete with its associated information.	(Hidayah, 2020; How et al., 2022; Kim How et al., 2022; López et al., 2016; Reid O'Connor & Norton, 2022; Vaiyavutjamai & Ken Clements, 2006)
Difficulty in interrelating different solution methods.	A mechanism to represent a quadratic equation in various forms and to display the effect of changing a coefficient in one form to other forms.	(Anggraini & Kartini, 2020; Hidayah, 2020; López et al., 2016; Reid O'Connor & Norton, 2022; Zakiyah et al., 2021)

Challenges	Requirements	Additional References
Dull teaching method.	Interesting and interactive teaching aid.	(Alabdulaziz, 2021; Anggraini & Kartini, 2020; Fatoni et al., 2017; Kim How et al., 2022; Rembulan & Putra, 2018)
Difficulty in accessing the internet and finding resources in their languages.	An offline teaching aid that uses both English and Bahasa Indonesia.	(How et al., 2022)
Tendency to get easily distracted and side-tracked with irrelevant contents.	Simple and intuitive interface.	(Fatoni et al., 2017; How et al., 2022)

Table 1: Mapping from Students' Challenges to Requirement

Implementation

To ensure that the digital teaching aid can address all studied challenges, each requirement in Table I is then derived into features. First, note that from the fourth requirement, an offline teaching aid may be desirable since it has less distractions. Hence, the teaching aid is developed in the form of an offline computer application. Moreover, as stated in the requirements, users will be able to choose their preferrable language, either in Bahasa Indonesia or English. When the application is first launched user will be prompted to choose the language as shown in Figure 1. In this paper, however, the application will be shown only in English.
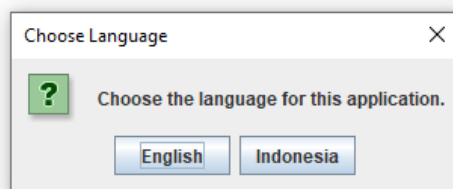
Figure 1: A dialog to choose between English and Bahasa Indonesia

The offline computer application is made to be simple and intuitive as required in the fifth requirement. In total, there are five menus in the application, which will be explained in the next few paragraphs. To ensure simplistic interface, each menu has a consistent design that consists of two panels. The panel on the left is used to input and control the quadratic equations, while the one on the right will display the graph of the given equations. To provide an intuitive interface, the application provides textboxes as the main input mechanism where users can enter the coefficients. Furthermore, clear error messages will be shown for every incorrect input. Figure 2 shows an example of an error message when users' input is not a number.
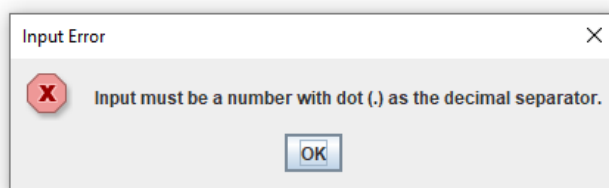
Figure 2: An error message when users' input is not a number

The next feature is developed to fulfill the first requirement, that is to show the equations and their graph simultaneously. A menu is specifically designed where users can specify at most six quadratic equations to be compared. The associated graphs will be displayed after users click the "Draw Graph" button. Each displayed graph can then be clicked to show the important information regarding the equation, which includes the intercepts, extreme points, and any intersections among the graphs. The actual coordinate of each point will appear when users click the point. This "Types" menu and its features can be seen in Figure 3.
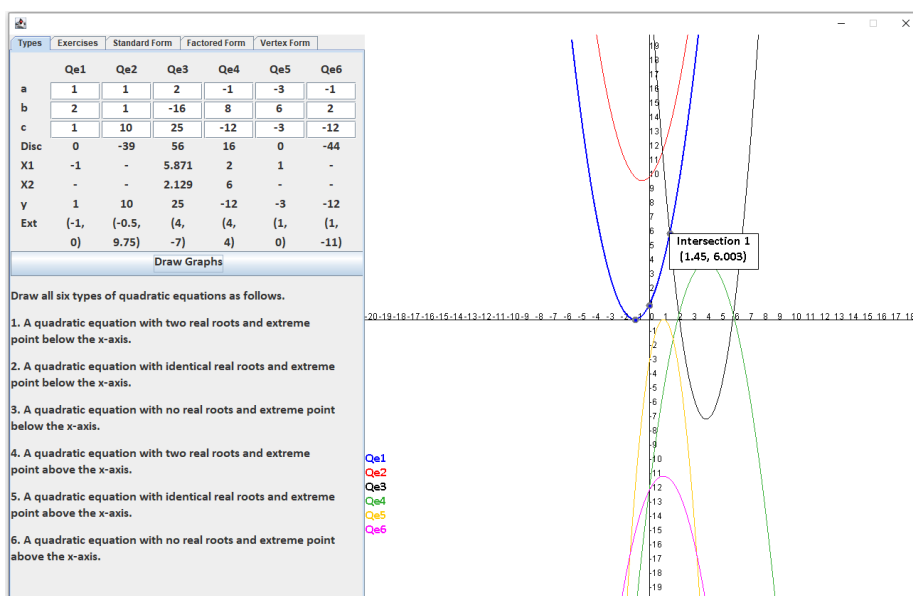
Figure 3: The interface for the "Types" menu

Figure 4: The interface for the three "Forms" menu

The second menu consists of three other menus to show the different forms of a quadratic equation, which is standard, factor, and vertex forms. These menus are meant to help students understand the relationship between the three forms. Through these menus, teachers can emphasize the different important information inherent in each form. These menus can also help students in see how each quadratic form can be used to find solutions of the quadratic equations. In addition, users should be able to experiment with the coefficients in one form and see how it affects the other quadratic form, which may enrich users' comprehension on interrelating different forms of a quadratic equation. Figure 4 displays these three "Form" menus.
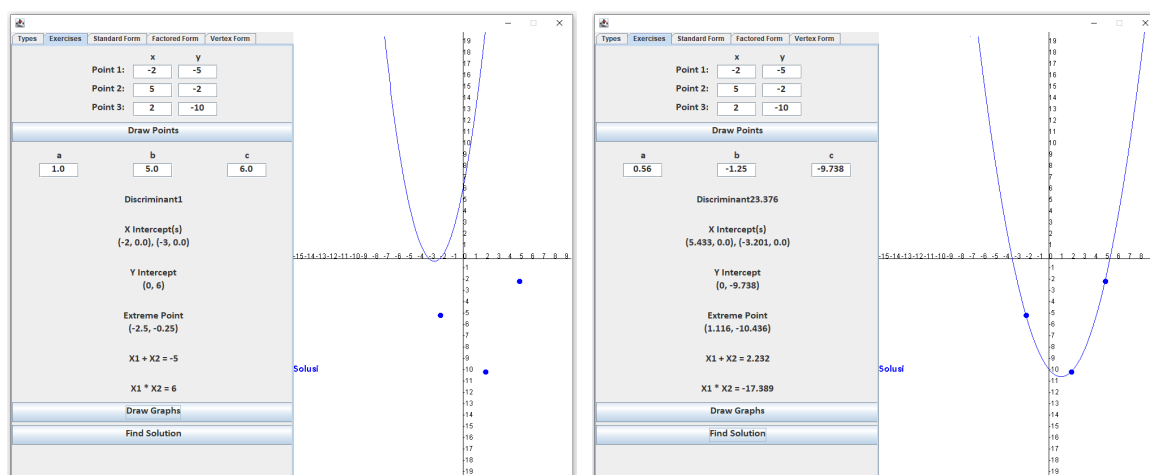
Figure 5: The interface for the "Exercise" menu. The left shows the graph from students' input in the textboxes. The right shows the solution when the "Find Solution" button is clicked.

To provide an interesting and interactive teaching aid, sliders are used to ease the users in experimenting with each coefficient in each quadratic form, as can be seen in Figure 4. This reasoning is also supported in (Fatoni et al., 2017). Aside from that, the last menu called "Exercises" is developed with a simple game where teachers can assign three points and students can guess the quadratic equation that passes the given points. Students input their answer in the textboxes and click the "Draw Graph" button to see whether they give the correct answer. A "Find Solutions" button is provided to help solve the game by calculating the correct coefficients and drawing the associated graph. This menu is displayed in Figure 5. A summary of the derived features is given in Table 2.

Requirements	Features
An offline teaching aid that uses both English and Bahasa Indonesia.	Offline computer software that supports both English and Bahasa Indonesia.
Simple and intuitive interface.	An interface with well-defined input mechanisms, consistent design, and clear error message for each incorrect input.
A mechanism to visualize quadratic equations into graphs complete with its associated information.	Menu "Types" with automatic graphs-generation from given quadratic equations where each graph can be clicked to display associated information.

Requirements	Features
A mechanism to represent a quadratic equation in various forms and to display the effect of changing a coefficient in one form to other forms.	Three "Form" menus where users can enter and modify a quadratic equation in one form and see how it is represented in other forms.
Interesting and interactive teaching aid.	Menu "Exercises" with a simple game where teachers can assign three points and students can guess the quadratic equation that passes the given points. Sliders are added in the three "Form" to help modify the quadratic equation.

Table 2: Mapping from Requirement to Features

Conclusion

A digital teaching aid in the form of offline computer software has been developed to address challenges in the teaching and learning of quadratic equations. A literature review was conducted to identify common challenges discovered in various studies from Indonesia and various other countries. Three common challenges were identified, which are inability to obtain conceptual understanding, difficulty in interrelating different solution methods, and dull teaching methods. In addition, the use of digital teaching methods was found to cause additional challenges in the form of accessibility and distraction. In total, there were five challenges that was addressed in this discussion.

The five challenges were mapped to five requirements. To improve students' conceptual understanding, the teaching aid is equipped with the mechanism to visualize a quadratic equation into graph that students can interact with to display its associated information. Afterwards, a mechanism to represent a quadratic equation in standard, factor, and vertex forms are necessary to overcome students' difficulty in interrelating different solution methods. Furthermore, the ability to interact with the coefficients and see the immediate effects on its visual representation can help students in building the relation among the three forms. The teaching aid should also be interesting and interactive to help students to have more motivation to explore and learn the materials. To make the teaching aid accessible to students in Indonesia, it should have Bahasa Indonesia support and be available offline. Moreover, simple and intuitive interface is required to reduce distractions in learning.

To fulfil the five requirements, five features are developed. First, the teaching aid is built in the form of offline computer software that supports both English and Bahasa Indonesia. Moreover, the software is made with well-defined input mechanisms, consistent design, and clear error message for each incorrect input to satisfy simple and intuitive interface. This software has three menus, "Types", "Form", and "Exercises". The "Types" menu enables users to enter several quadratic equations and visualize the graphs where each graph can be clicked to display associated information. The "Form" menu consists of three other menus for standard, factor, and vertex forms. Through these menus, users can enter and modify a quadratic equation in one form and see how it is represented in other forms. Sliders are added in the three "Form" to help modify the quadratic equation. Lastly, menu "Exercises" has a simple game where teachers can assign three points and students can determine the quadratic equation that passes the given points.

Acknowledgments

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Instructional Design Model of Virtual Reality Digital Integration: An Experimental Case Study in Managerial Control Education

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Abstract

Virtual reality immersive learning technology is widely recognised for offering the potential for fully immersive environments that can enhance learners' cognitive development. This paper introduces instructional guidelines for the creation and integration into the learning design of pedagogically structured virtual reality digital content to support cognitive learning. The learning prototype created for the study simulates a series of situated work-life scenarios where the learners must reflect on their behavioural intentions in response to socio-cognitive conflicts encountered during learners' creation of their knowledge. A learning management system and an immersive virtual reality learning platform support the virtual constructivist learning environment. The learning prototype constitutes a valuable tool for researchers aiming to demonstrate that immersion in a reality based environment, engagement with complex and ambiguous situations and information, and interaction with space can significantly enhance learning performance. This study features a management accounting course where learners prepare a dashboard of performance indicators for a business organisation.

Keywords: Situated Cognition, Immersive Learning, Virtual Reality

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Introduction

Several studies have examined the effects of situated learning on knowledge acquisition and evidenced that learning in situated environments makes knowledge transfer more efficient and facilitates the acquisition of transferable knowledge in real-life contexts. The core assumption of situated cognition is that learning inherently ties to the social and cultural contexts in which it occurs. Immersion in a virtual environment, engagement with complex and ambiguous situations and information, and interaction with space can significantly enhance learning performance. Zheng (2010) compared learning performance between situated and traditional learning and found a positive correlation between situated learning and learner performance.

Situated cognition represents another challenge for instructional designers and educators because it requires balancing what is known and what is currently being experienced (the incoming information and new knowledge). Existing literature on socio-cognitive conflicts suggests that learners demonstrate various types of behavioral intentions in response to socio-cognitive conflicts when learners interact in groups to develop new knowledge (Cheng, 2014).

Conflict regulation is defined as the meaning people attribute to conflict when facing another's idea that contradicts their own. It determines the conditions under which confronting diverging ideas results in positive cognitive and relational outcomes (Darnon, 2019). Darnon (2019) argued that socio-cognitive conflicts benefit learning because conflict is regulated through specific mechanisms to ensure that the conditions under which confronting diverging ideas results in positive cognitive and relational outcomes are met. Truhlar (2018) investigated the factors that influence students' engagement in synchronous online discussions and found that assigning roles increases the proportion of critical student–student interactions.

Research Background

In managerial control and accounting, scholars have claimed that more research should be conducted to examine the integration of management accounting and psychology. Hall (2016) argued that focusing on the individual level and dynamic perspectives is necessary to drive further theoretical developments in management accounting research. He said: "A prominent feature of organizational-level studies is the lack of explicit attempts to theorize the psychological processes through which management accounting practices are expected to influence individual behaviour and, in turn, how individual behavior is expected to combine to influence organizational-level outcomes such as organisational performance" (p. 66). Research in contingency-based management accounting has evidenced that Managerial Control Systems (MCS) lie on a continuum between two alternative models of transactional or relational types, representing an organisation's dominant behavioural orientations or preferences. Townley et al. (2013) argued that performance measurement should integrate two dimensions of rationalization in social action: communicative rationality (the pursuit of reason in human affairs) on the one hand, which brings to light the justifications by which actions and policies are pursued, and rationalisation on the other hand (which represents the cognitive dimension of instrumental rationality to specify the means and ends of organizational actions and activities). The combination of the 'interplay' of those two dimensions constitutes an essential factor in constructing performance systems.

Research Objectives

Our study aims to develop a learning prototype, called *MPP business simulation,* to help design a learning process and propose an underlying socio-cognitive model of the twin dimensions of rationality in social action explained above to support the design of the learning process. In the *MPP business simulation*, learners prepare a dashboard of performance indicators and encounter a series of real-life scenarios to support cognitive learning in constructing performance measures. Those scenarios are intended to simulate situations where learners respond to socio-cognitive conflicts by adopting different types of behavioral intentions. The learning process reflects the interplay between instrumental and communicative rationality in social action which is necessary. Those scenarios are supported by immersive learning environments combining a dual infrastructure of a Learning Management System (LMS) and a Virtual Reality (VR) technology platform.

Learning Prototype

In the *MPP business simulation*, learners prepare a dashboard of performance indicators by encountering a series of situated scenarios supported by the Virtual Reality platform to enhance learners' cognitive development. Cognitive learning is driven by learners' behavioural intentions in response to socio-cognitive conflicts when learners interact in groups through knowledge construction. Participants are invited to answer questionnaires on their behavioural intentions before interacting in meetings with other participants and reflecting on their behavioural learning styles. They are also invited to receive feedback and guidance from mentors to assist and give advice on preparing for meetings. Situated scenarios in a structured learning process supported by a dual infrastructure of an LMS and a VR technology platform greatly help to enhance cognition among learners in the process of knowledge construction of performance measures.

The pedagogical approach employs a multi-faceted viewpoint encompassing the learning environment, processes, tasks, socio-cognitive, technological aspects, and learning design. Forum discussion allows learners to engage and discuss online to get answers to their questions or corresponding feedback. Interactions with fictitious roles like *MPP CEO Office* or *MPP CFO Office* cannot be supported in real-time in the VR platform via avatars but are made possible by using discussion forums in the LMS on an asynchronous basis. Those activities aim to facilitate feedback and advice to project teams along the different preparation steps of their business case. Correspondingly, the objective of feedback sessions is to facilitate the process of data requests in *MPP business simulation*. Figure 1. Below is an example of a situated scenario.
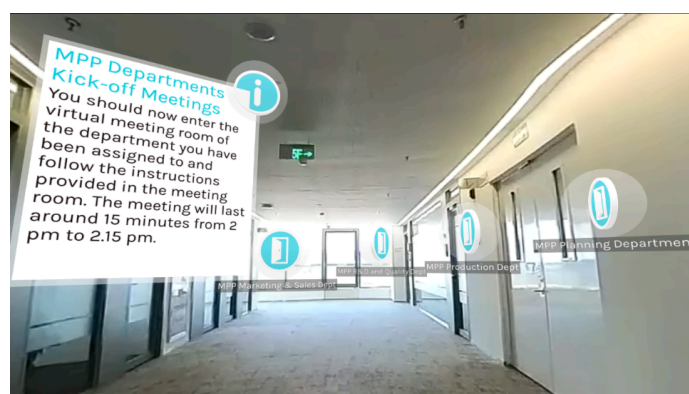

Figure 1: Situated Scenario (Department Meeting Virtual Space)

Socio-cognitive Model

The socio-cognitive model underlying the instructional design strategy and learning process design is based on the central assumption that the construction of performance measures should embed 'socially constructed' two opposite dimensions as part of the same rationalization process: reasoned justification and instrumental mastery. Fig 2 below describes this model.
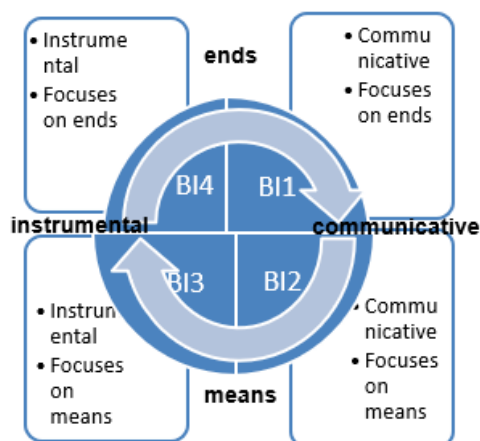

Figure 2: Socio-cognitive Model

Research Avenues

It is suggested that the socio-cognitive model underlying the instructional design strategy and learning process design could be investigated further through a series of scenario-based experiments to test a causality model to determine psychological determinants of collaborative behaviours in knowledge construction of performance measures. The purpose is to determine psychological factors influencing collective behaviors when individuals participate in the construction of a set of performance measures (performance dashboard) for a business organisation. The experiment is conducted in three steps. At each step, all students are asked to complete survey questionnaires to measure their behavioural intentions and the antecedents' variables to those intentions. Those questionnaires are completed in around ten minutes right before the start of three specific types of learning activities (virtual meetings), which are critical to constructing performance measures in terms of social interaction. When answering the questionnaires, participants are presented with short scenarios and asked to indicate how they would prefer to respond to the scene and how they would prefer to interact with other participants. Those short scenarios replicate the same situations and context that participants would encounter in the learning activity right after answering the questionnaire to ensure that their responses are consistent with the context in which students are immersed. In the next step, students from the experimental group must attend learning activities to change their attitudes and perceptions of social norms (treatment). Those learning activities are supposed to help students reflect on their learning experience and understand the reasons and benefits of collaboratively engaging in the learning activities. The originality of the experiments relies on a particular research design using a Virtual Constructivist Learning Environment.

Conclusions

Tycho (2021) acknowledged a dearth of practical guidelines for learning design in immersive environments. *MPP business simulation* learning prototype attempts to bridge this gap, by advancing the field of instructional design and helping to formulate strategies, methodologies, and tools for cognitive learning vital for the success of immersive educational environments.

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An Analysis of Students' Mathematical Thinking Through Task Sequence on Division in Classroom Using Open Approach

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Abstract

The purpose of this research aimed to analyze students' mathematical thinking that occurred in task sequence on division. The participants were 9 students in grade 4. The research methodology was qualitative method based on Lesson Study processes: collaboratively plan 5 research lessons, collaboratively do with include 4 steps of Open Approach: 1) posing open-ended problems, 2) students' self-learning, 3) whole-class discussion and comparison, and 4) summarizing by connecting students' mathematical ideas. Finally process was collaboratively reflection after lesson. Data collected from students' worksheet, textbook, and field note. The results showed that in mathematics classrooms using the Open Approach, students' mathematical thinking occurred in order of task sequence on division from all 4 characteristics which were 1) The specification of the tasks allowed students to discover the rules of division by seeing the relations of the symbolic sentences generated from the tasks, 2) The generalization of tasks prompted students to generalize the relations of division rules discovered in tasks with specificity, 3) The extension of the tasks allowed students to apply division rules to expand learning to solve division tasks of tens and hundreds, and 4) The integration allowed students to integrate the rules of division and also the division of tens and hundreds in order to solve the division of large numbers.

Keywords: Mathematical Thinking, Task Sequence, Open Approach

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Introduction

The purpose of mathematics education extends beyond the acquisition of numerical proficiency. It is a vital tool for fostering essential human qualities and nurturing a creative and competent citizenry equipped to enhance societal harmony (Mangao, Ahmad, and Isoda, 2017). The basic principle of learning mathematics is that student should learn by or for themselves, and in every class we teach the methods of developing mathematics, mathematical ideas, and its values for student's further learning. By teaching mathematical thinking consistently, we can prepare student to think by or for themselves (Isoda & Katagiri, 2012).

Teaching by Open Approach aims that all students can learn mathematics in response to their own mathematical power, accompanying with certain degree of self-determination of their learning, and can elaborate the quality of their process and products toward mathematics (Nohda, 2000). Inprasitha (2022) stated that he incorporated the Open Approach into the Do step of Lesson Study to generate students' independent learning and transform teachers' traditional teaching approach. A classroom using the Lesson Study and Open Approach is a mathematics classroom where teachers use the Open Approach as a teaching approach and use the Lesson Study as a way to improve the teaching approach (Inprasitha, 2015). The Lesson Study process consists of 3 steps: Step 1 collaboratively design lesson (Plan), Step 2 collaboratively observe lesson (Do) which includes 4 steps of the Open Approach: 1) posing open-ended problems, 2) students' self-learning, 3) whole-class discussion and comparison, and 4) summarizing by connecting students' mathematical ideas, and Step 3 collaboratively reflect on teaching practice (See) (Inprasitha, 2011, 2022).

The Center for Research in Mathematics Education at Khon Kaen University translated Japanese mathematics textbooks for use in schools implementing Lesson Study and Open Approach as innovations in teaching mathematics (Inprasitha, 2006). In the textbook, tasks and problems are arranged according to the curriculum sequence. A task with various possible solutions is presented to help student distinguish between what they have already learned and the aspects that are yet to be learned, rather than focusing solely on the answer to the specific task. To solve these tasks, student need to make the unknown understandable. The textbook employs a sequence of extension based on what the student have learned previously and teaches them how to extend mathematical ideas using this extension sequence (Isoda & Katagiri, 2012). This approach is supported by Isoda & Olfos (2021), who highlight the outstanding feature of the textbook-well-configured task sequences for extension and integration. The opportunity for extension and integration is a chance to reorganize their mathematics by comparing what they already knew and their developed mathematical ideas. At the moment of extension and integration on the task sequence, students are able to establish the significant meaning.

Mathematical ideas serve as the basis of content knowledge related to promoting and developing mathematical thinking. (Mangao, Ahmad, and Isoda, 2017). The most important ability that needs to be cultivated in order to instill in student the ability to think and make decisions independently is mathematical thinking (Isoda & Katagiri, 2012). The ability to think mathematically and to use mathematical thinking to solv eproblems is an important goal of schooling. In this respect, mathematical thinking will support science, technology, economic life and development in an economy. Such mathematical thinking is foundational in preparing student to navigate the complexities of the world with analytical and reflective minds. If teachers are to encourage mathematical thinking in students, then they need to engage in mathematical thinking throughout the lesson themselves (Stacey, 2007).

Purpose

The purpose of this research was to analyze students' mathematical thinking that occurred in task sequence on division.

Methodology

Context of Study

The researcher has been taught mathematics with the Lesson Study and Open Approach during the pre-service within teaching practicum school. Currently, the researcher is an in-service teacher in Thailand and has been implementing the Open Approach as a teaching approach to teach mathematics at the present school which is a small school.

The target group comprised 9 students from a total of 9 students in grade 4. These students were enrolled in mathematics classrooms that implemented the Open Approach for 1 semester and were taught by the researcher.

The research content on division for grade 4 students is derived from a mathematics textbook produced in collaboration with the Center for Research on International Cooperation in Educational Development (CRICED), University of Tsukuba, Japan, and the Center for Research in Mathematics Education (CRME), Khon Kaen University, Thailand. In this book, tasks on division, specifically focusing on division rules, are arranged in the following sequence:
1. The rules governing the relationship between divisors and quotients.
2. The rules governing the relationship between dividends and quotients.
3. The rules governing the relationship between dividends and divisors.
4. Apply division rules to solve problems involving the division of tens and hundreds.

Research Procedure

The research methodology was a qualitative method based on Lesson Study and Open Approach (Inprasitha, 2011, 2022):

Step 1: Collaboratively Plan: The Lesson Study group gathers to discuss and design a lesson, taking into consideration students' mathematical thinking, and determines open-ended mathematics problems from the task sequence on division in the grade 4 textbook.

Step 2: Collaboratively Do: The Do step is implementing the planned lesson. The Lesson Study group observes the learning activities with the aim of focusing on students' mathematical thinking. The Do step is incorporated with 4 phases of the Open Approach: 1) Posing open-ended problems is the process in which the teacher presents a problem situation as a task to the student making problem posing, 2) Students' self-learning is the step where students take action to solve their problems, 3) Whole-class discussion and comparison is the stage where students present their ideas to the class, engage in collective discussions, and compare different perspectives. This provides students with the opportunity to learn from their classmates' ideas, and 4) Summarizing by connecting students' mathematical ideas is connecting various student ideas that arise in class. The teacher and students summarize the lesson together based on students' mathematical ideas.

Step 3: Collaboratively See: The Lesson Study group would meet to collectively reflect on the learning activities they have observed.
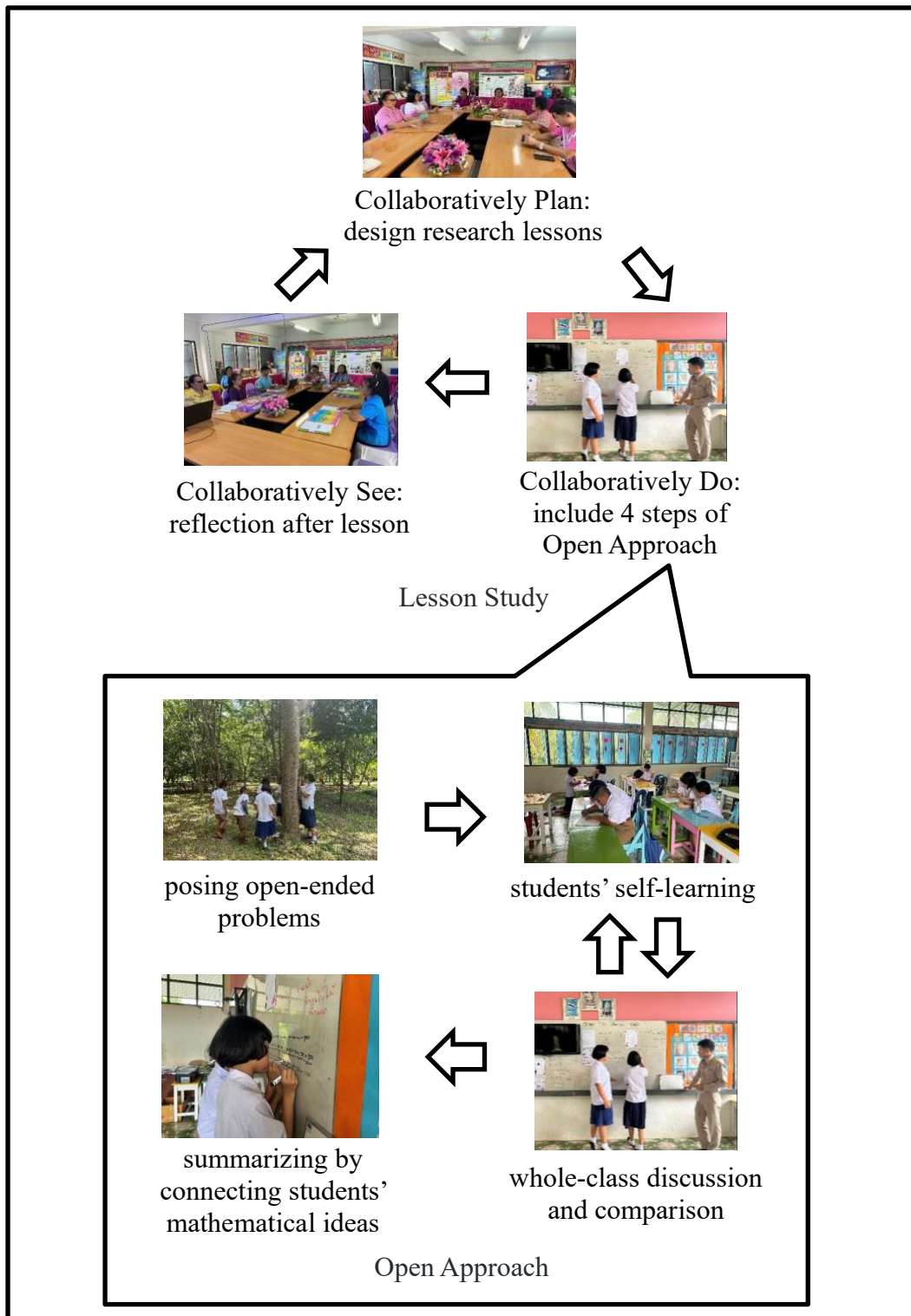

Figure 1: Research Procedure based on Lesson Study and Open Approach (Inprasitha, 2011, 2022).

Data Collection and Data Analysis

Data were collected from students' worksheets, textbooks, and field notes. The data were analyzed using the conceptual framework of Mangao, Ahmad, and Isoda (2017), which comprises the following components: 1) Specification, 2) Generalization, 3) Extension, and 4) Integration.

Results

The research results, derived from empirical evidence collected in grade 4 mathematics classrooms using the Open Approach and implementing the task sequence on division from the grade 4 textbook, posing open-ended problems for students, students take action in solving their problems, students present their ideas to the class, engaging in collective discussions, comparing different perspectives, and summarizing by connecting students' mathematical ideas, demonstrate that students' mathematical thinking occurred in the order of the task sequence on division. These findings will be presented following the conceptual framework of Mangao, Ahmad, and Isoda (2017), encompassing all four characteristics, which are:

1. Specification: Students discover the rules of division by seeing the relations of the symbolic sentences generated from the tasks in Figure 2.

Figure 2: Tasks in textbook on Specification (Inprasitha et al., 2010).

In this task, the mathematical thinking of the students will be illustrated in Figure 3 and Figure 4.
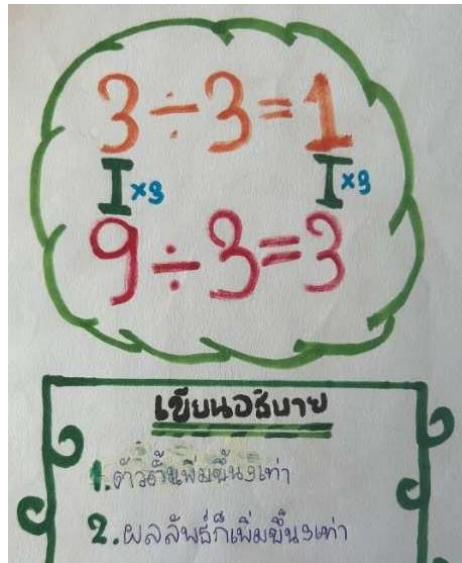
Figure 3: Students' worksheet on Specification (1)

In Figure 3, Students discover the rules of division by examining the relationships in the symbolic sentences: $3 \div 3 = 1$ and $9 \div 3 = 3$. These symbolic sentences illustrate the rule of division that if the dividend is tripled, the quotient will triple as well.
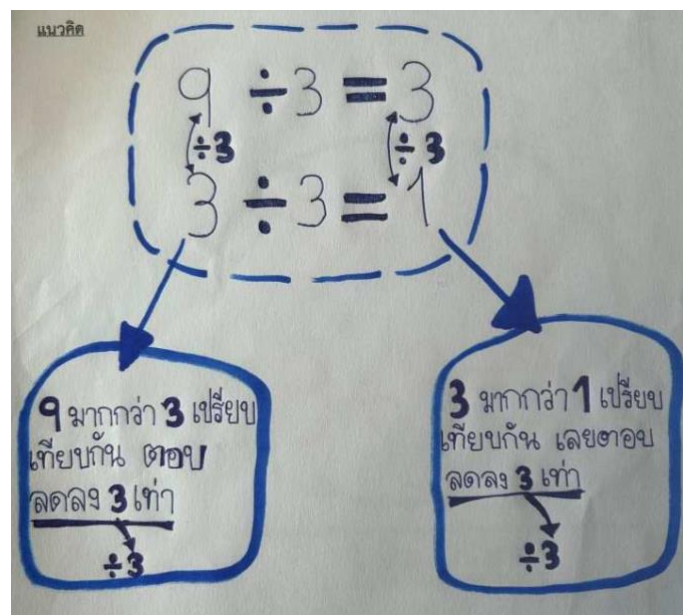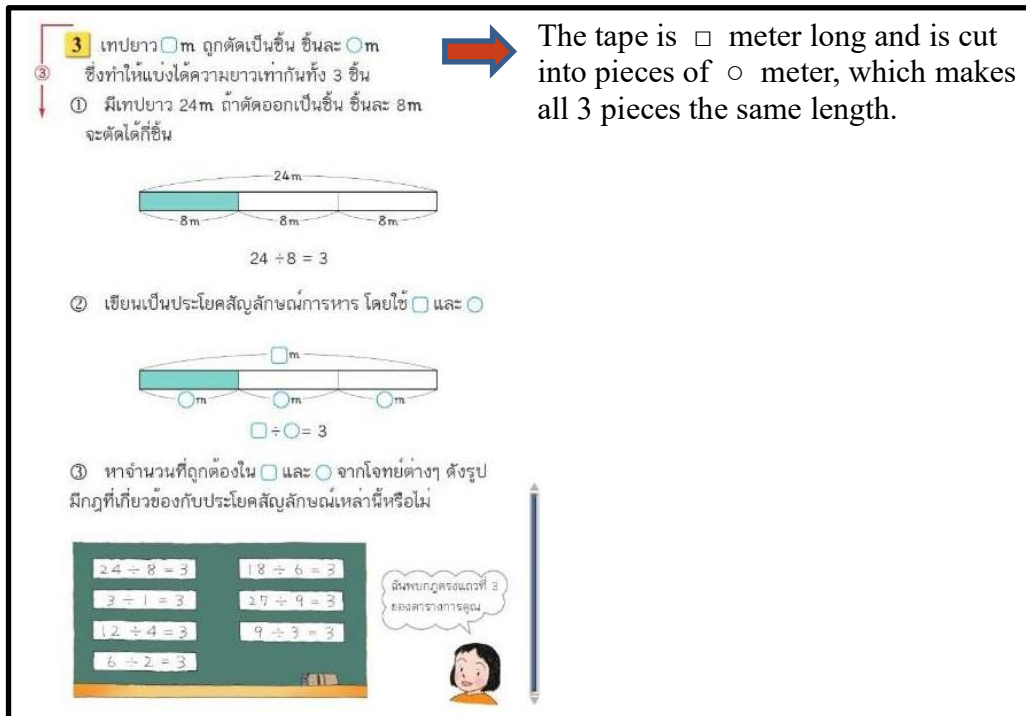

Figure 4: Students' worksheet on Specification (2).

In Figure 4, Students discover the rules of division by examining the relationships in the symbolic sentences: $9 \div 3 = 3$ and $3 \div 3 = 1$. These symbolic sentences illustrate the rule of division that if the dividend is divided by 3, the quotient will also be divisible by 3.

2.   Generalization: Students generalize the relations of division rules discovered in tasks with specificity in Figure 5.
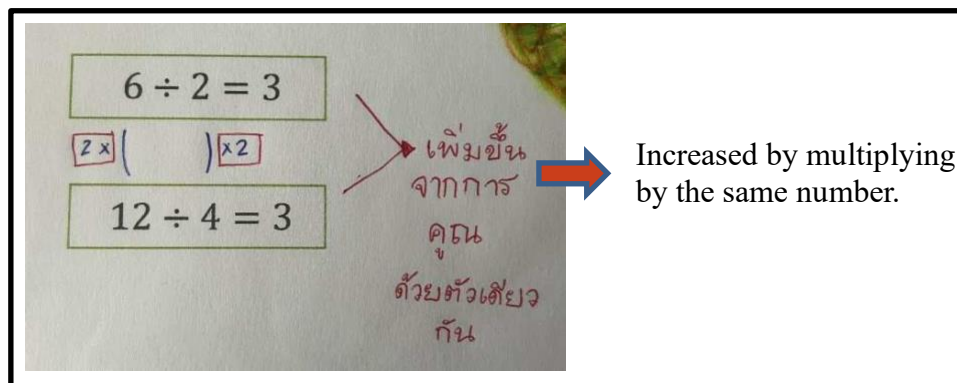
Figure 5: Tasks in textbook on Generalization (Inprasitha et al., 2010).

In this task, the mathematical thinking of the students will be illustrated in Figure 6 and Figure 7.

Figure 6: Students' worksheet on Generalization (1).

In Figure 6, Students can generalize by changing from multiplying the dividend by 2, and from multiplying the divisor by 2 to multiplying by the same number. This will result in the same quotient.
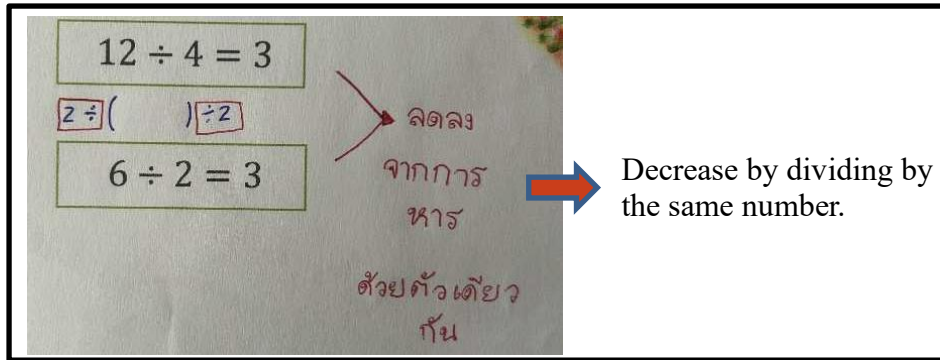
Figure 7: Students' worksheet on Generalization (2).

In Figure 7, Students can generalize by changing from dividing the dividend by 2, and from dividing the divisor by 2 to dividing by the same number. This will result in the same quotient.

3.　　　Extension: Students apply division rules to expand their learning to solve division tasks of tens and hundreds in Figure 8.

Figure 8: Tasks in textbook on Extension (Inprasitha et al., 2010).

In this task, the mathematical thinking of the students will be illustrated in Figure 9.
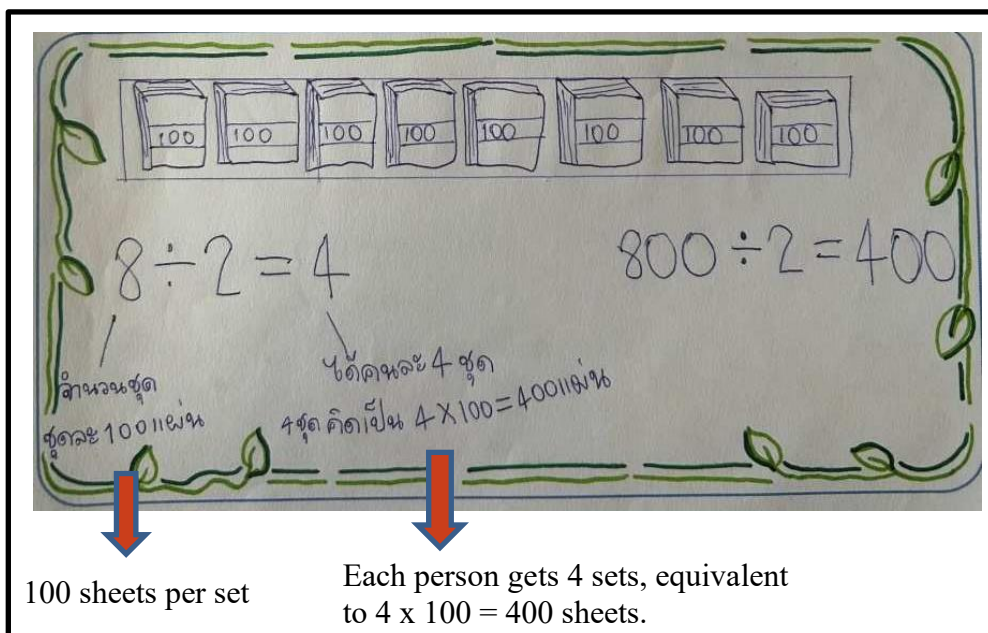

Figure 9: Students' worksheet on Extension.

In Figure 9, Students apply division rules governing the relationship between dividends and quotients to expand learning to solve division tasks of hundreds.

4.   Integration: Students integrate the rules of division and also the division of tens and hundreds in order to solve the division of large numbers in Figure 10.
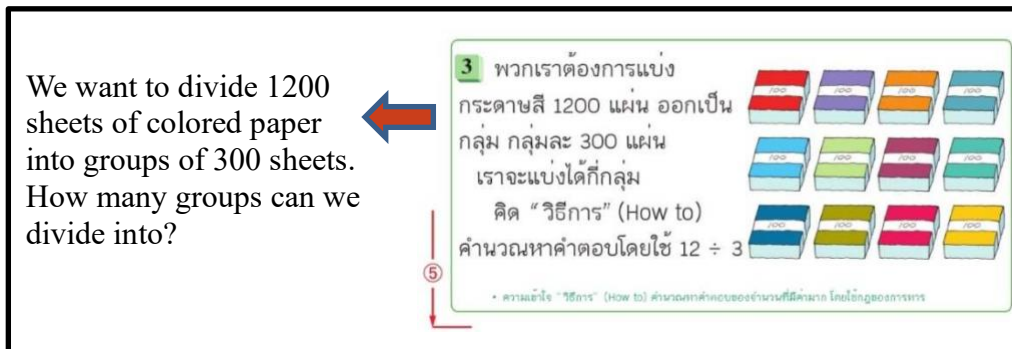

Figure 10: Tasks in textbook on Integration (Inprasitha et al., 2010).

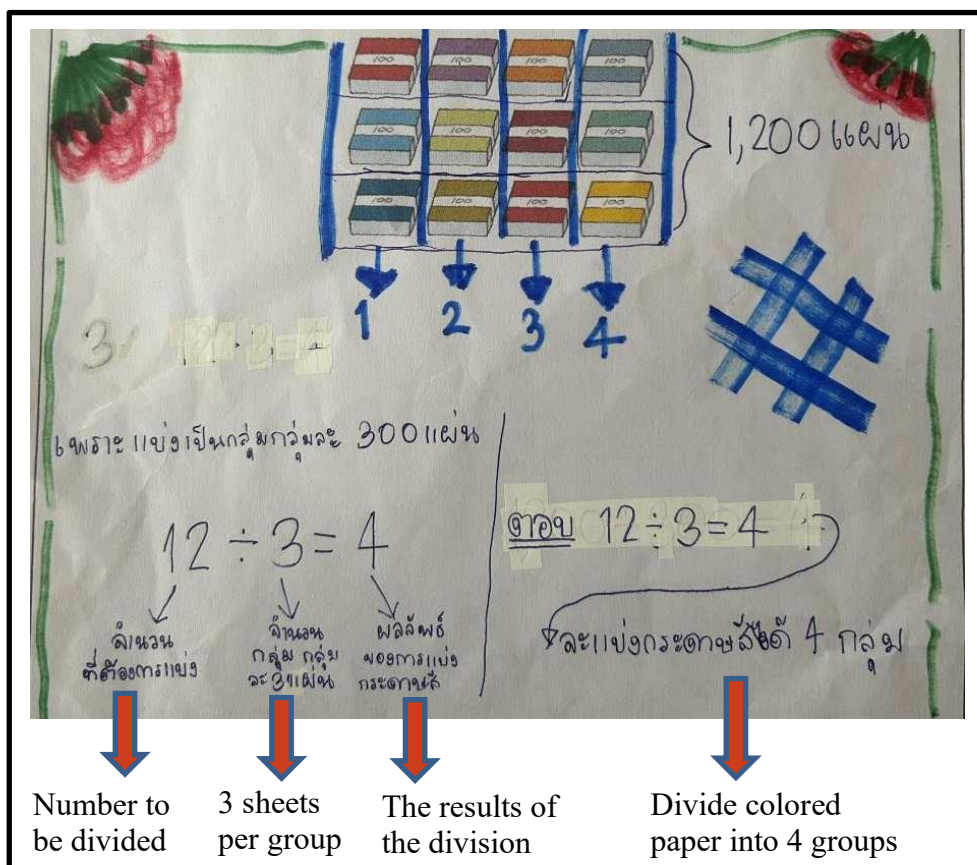In this task, the mathematical thinking of the students will be illustrated in Figure 11.

Figure 11: Students' worksheet on Integration.

In Figure 11, Students integrate the rules governing the relationship between dividends and divisors and also the division of hundreds in order to solve the division of large numbers.

Conclusion

The results showed that students' mathematical thinking occurred in order of task sequence on division from all 4 characteristics which were:
1. The specification of the tasks allowed students to discover the rules of division by seeing the relations of the symbolic sentences generated from the tasks.
2. The generalization of tasks prompted students to generalize the relations of division rules discovered in tasks with specificity.
3. The extension of the tasks allowed students to apply division rules to expand learning to solve division tasks of tens and hundreds.
4. The integration allowed students to integrate the rules of division and also the division of tens and hundreds in order to solve the division of large numbers.

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Virtual Reality as Supplementary Education Tool for Pharmacology Laboratory Practical: The Effect on Student Experience, Knowledge and Confidence

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Abstract

Virtual Reality is an emerging technology for immersive learning. A Virtual Reality Organ Bath Lab (VROBL) simulating the physical pharmacology laboratory practical was developed to help students to comprehend complex pharmacological principles. The study aimed to investigate the impact of VROBL adoption as a pre-laboratory experience on student learning experience, knowledge, and confidence levels. An experimental research study was conducted with a study sample of 17 health science students enrolled in a Biomedical Science module. The participants were divided into intervention (n=9) and control groups (n=8) using block randomization. The intervention group experienced virtual learning with VROBL before the laboratory session, while the control group was exposed to the software after the laboratory session. A pre-post study design was adopted, whereby questionnaires were administered before and after the VROBL and physical laboratory sessions. The completion times of physical laboratory tasks were recorded. Data collected revealed that the intervention group was satisfied with the simulation (mean±SD: 4.97±1.24) and learning content (mean±SD: 5.81±1.21) of VROBL. Furthermore, the intervention group reported an increased confidence in correctly explaining how to use the lab equipment and apparatus compared to the control group (mean: 4.77 vs. 3.50, p=0.044). The finding was supported by positive feedback of VROBL as a pre-laboratory exercise. However, there was no significant difference between both groups in knowledge quiz scores and completion times of physical laboratory tasks. Although VROBL did not improve student knowledge or performance in the physical laboratory, it had enhanced student learning experiences and confidence, which ultimately might improve student motivation and learning outcomes.

Keywords: Virtual Reality, Pharmacology, Learning Experience

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Introduction

The fourth Industrial Revolution (IR 4.0) is transforming the higher education from traditional learning into technology-based learning. Educators are encouraged to gain knowledge and skills and seek alternative approaches to fully maximize the students' learning experience (Aziz Hussin, 2018). This includes the incorporation of digital technologies in higher education. In recent years, a myriad of technological innovations, including Virtual Reality (VR) and Augmented Reality (AR), have been developed and leveraged by the educators in alignment with IR 4.0 (Ikhsan et al. 2020).

Pharmacology, being a complex subject, necessitates a conceptual understanding of drug effects and interactions with biological systems. Traditionally delivered through didactic teaching, students often face challenges in grasping these concepts due to the three-dimensional nature of both drugs and biological systems. This intricacy makes effective illustration and explanation difficult in both classroom and lab practical settings. Furthermore, although essential lab skills such as the micropipetting technique are integral for science students, limitations in teaching resources often restrict the inclusion of hands-on laboratory exercises in the curriculum. Despite the widely recognized need for practical laboratory training to enhance skill acquisition, the call to adhere to the 3Rs—reduce, replace, and refine animal usage—has further limited the availability of hands-on exercises involving animals.

Virtual Reality (VR) is an emerging technology increasingly used in higher education to offer students engaging and interactive learning experiences. It enables exploration and interaction with virtual environments, simulating real-world scenarios. VR is employed for hands-on training in fields like medicine, engineering, and architecture (Bermejo et al., 2023), fostering improved learning immersion and the development of critical thinking and problem-solving skills. As VR technology advances, it plays an increasingly vital role in higher education. The 3D perspective offered by VR proves invaluable in comprehending pharmacological concepts, surpassing the limitations of traditional 2D graphics (Hanson et al., 2019, Ventola et al., 2019 White et al., 2023). In addition, VR provides opportunity for users to practice laboratory skills unlimitedly in risk-free virtual environment, reducing the use of animals in laboratory (Glassey & Magalhães, 2020).

During the COVID-19 pandemic, students had restricted access to the laboratory due to physical distancing. To complement the physical pharmacology laboratory practical, we developed a prototype of VR Organ Bath Lab (VROBL) that mimics the physical laboratory practical with the aim to stimulate students' interest and engagement in the laboratory. To date, there are limited studies on the impact of using VR laboratory to supplement pharmacology laboratory, especially in Malaysia. Thus, our study aimed to investigate the effects of VROBL as a pre-laboratory exercise on students' learning experience, knowledge, and confidence levels.

Methods

Ethical approval was obtained from the University of Nottingham Malaysia Ethics Committee (ELZN090222). This study took place in the University of Nottingham Malaysia. Inclusion criteria were Year 2 students aged 18 years and older and enrolled in a Biomedical Science module, namely Pharmacological Basis of Therapeutics. Monetary compensation was provided for study participation. Study sample of 17 health science students were

recruited voluntarily and divided into intervention (n=9) and control groups (n=8) using block randomization. The intervention group engaged in virtual learning with VROBL about 1 to 3 days prior to the laboratory session, while the control group did not experience VROBL before the laboratory session. A pre-post study design was adopted, where 7-point likert scale survey questionnaires, ranging from 0 to 7 (extremely dissatisfied to extremely satisfied) were administered before and after the VROBL and physical laboratory sessions. Four questionnaires were adapted from Cheesman et al. (2014) and administered using the online questionnaire service, Qualtrics. Data collection took place from March to April 2022. Participants were asked to complete the questionnaires based on their groups as follows:

Questionnaire 1: VROBL User Experience Survey (administered to intervention group only immediately after the VROBL)

Questionnaire 2: Confidence Survey (administered to both control and intervention groups immediately before the physical lab)

Questionnaire 3: Knowledge Quiz (administered to both control and intervention groups immediately after the physical lab)

Questionnaire 4: VROBL Perception Survey (administered to intervention group only immediately after the physical lab)

The data were collected anonymously. Informed consent was obtained from every respondent and the data were kept confidential. Completion times of individual participant for physical laboratory tasks were recorded to compare students' performance. The control group participants were given the opportunity to experience VROBL after the laboratory to avoid disadvantages. Quantitative data analysis was performed through Independent Sample T-Test using GraphPad Prism softrware. Data are presented as mean ± standard deviation (SD). A p value >0.05 was considered statistically significant.

Results

Our results indicated that the intervention group had an overall positive user experience with VROBL (Figure 1). The participants expressed satisfaction with the simulation software and quality (mean±SD: 4.97±1.24) and the educational content of VROBL (mean±SD: 5.81±1.21). One participant suggested to improve the sensitivity of the touchpad in the simulation while another participant reported glitches in the VROBL. 75% of the participants were satisfied with the explanation of the laboratory procedure in VROBL (mean±SD: 5.88±1.25). Majority of the participants (87.5%) were satisfied that VROBL has increased their interest in the organ bath laboratory (mean±SD: 5.88±1.13) and helped them to visualize the concepts related to the laboratory procedure (mean±SD: 6.00±1.07). Besides, 62.5% of the participants found it challenging to navigate and master the VROBL.
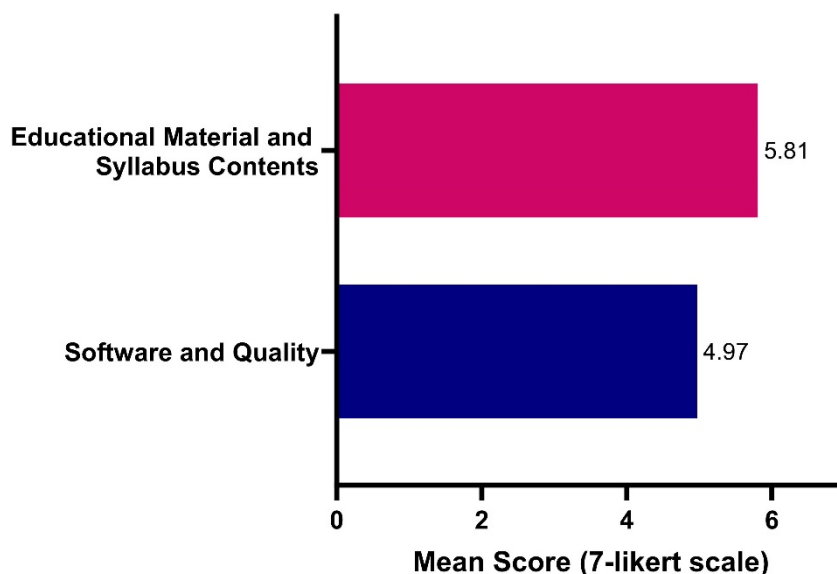
Figure 1: User Experience of VROBL on the software quality and content.

There was no significant difference in the average score of the confidence questionnaire between control and intervention groups (Figure 2). However, the intervention group did exhibit an increased confidence in one of the questions in confidence questionnaire, namely confidence in correctly explaining how to use the lab equipment and apparatus compared to the control group (mean±SD: 4.77±1.20 vs. 3.50±0.54, p=0.044). The time taken to complete the physical laboratory task was not significantly different between the control and intervention groups (857.2 seconds vs 853.5 seconds; p>0.05). Notably, there was no significant difference in the average score of the knowledge quiz between the control and intervention groups (mean±SD: 6.63±1.69 vs. 7.75±1.39, p>0.05) (Figure 3).
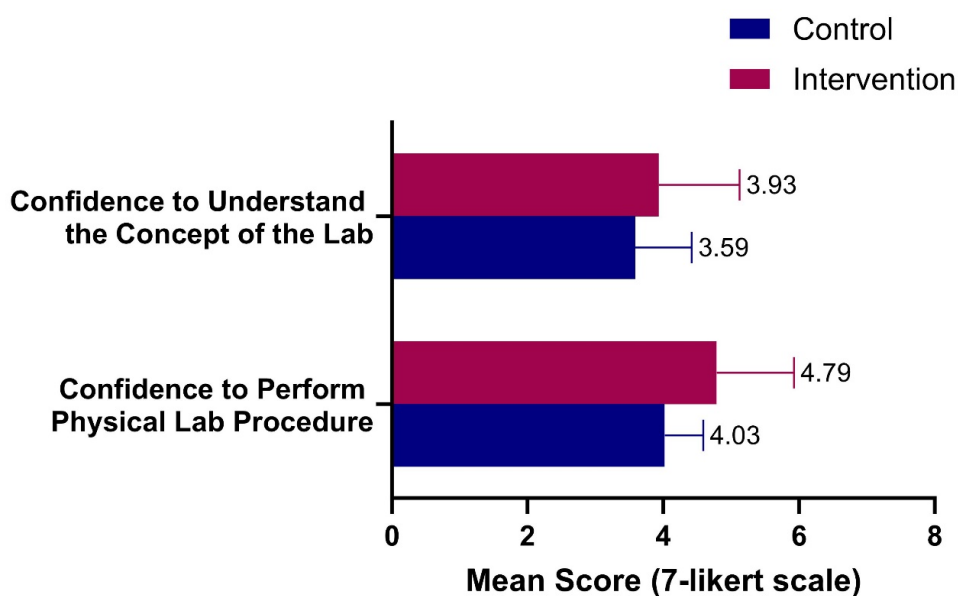

Figure 2: Average scores on the confidence questionnaire, consisting of
20 questions - 10 related to understanding lab concepts and
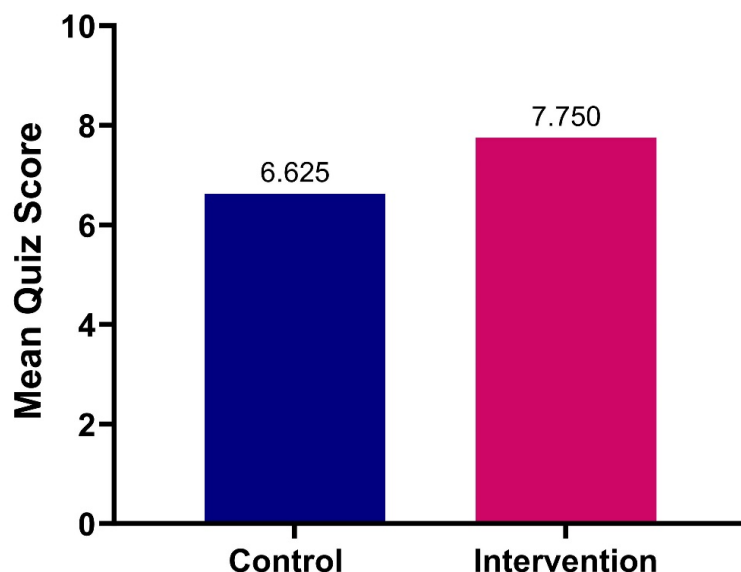10 pertaining to confidence in performing physical lab procedures.

Figure 3: Average scores of the knowledge quiz between the control and intervention groups.

In addition, we assessed the intervention group's perception of VROBL after completing the physical laboratory session. Overall, participants provided positive feedbacks on the VROBL expressing acceptance and acknowledging its usefulness as a tool for studying pharmacology (Figure 4). Qualitative feedbacks on VROBL are listed in Table 1. Overall, participants believed that VROBL, when provided as a pre-laboratory exercise, helped familiarize them with the physical laboratory procedure and reduced anxiety through pre-exposure to laboratory procedure. Besides, one participant recommended that a training session on how to use the VR controllers before VROBL may be helpful.
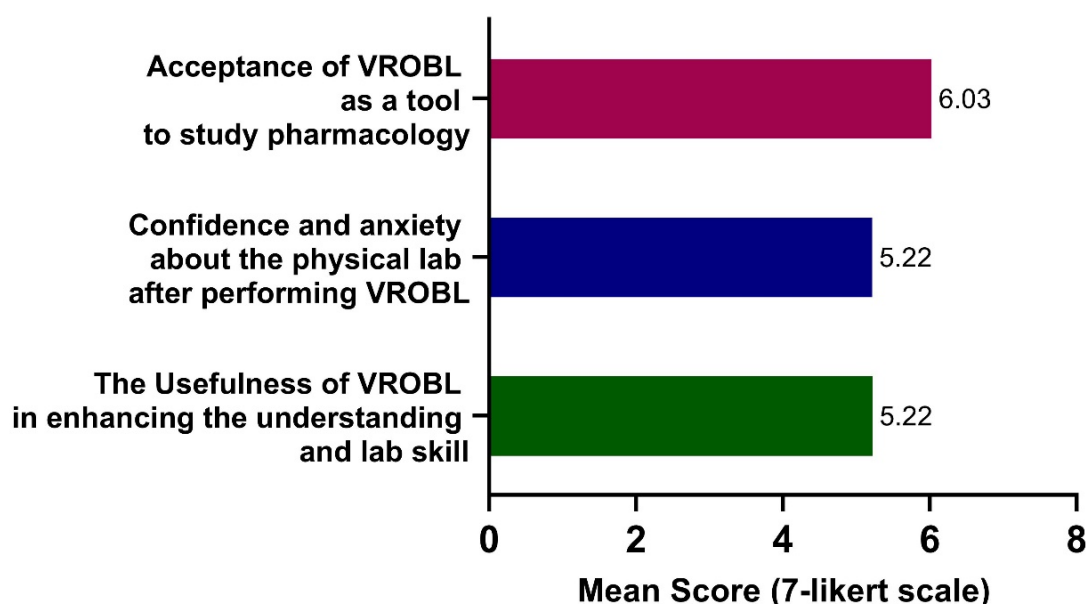

Figure 4: The intervention group's perception of VROBL
after completing the physical laboratory session.

How does VROBL experience affect the understandings and skills in performing hands-on laboratory tasks?	
1.	It helped me understand most of the experiment but I messed up the sequence of adding carbachol to the organ bath, which is my fault anyways. Overall the VR experience was great and helped me a lot
2.	It allows for familiarity
3.	Provide more help in calculations rather than the experiment set up
4.	VROBL helped me get used to how to administer carbachol into the organ bath and helped me visualise what an organ bath looked like and work.
5.	Give me heads up
How do your VROBL experience and its realism affect your confidence and anxiety in performing the hands-on laboratory tasks?	
1.	Less anxiety making the same mistakes
2.	I guess it's based on mindset? If you are confident that the VR helped you for the hands on lab experiment, then its easier
3.	The VROBL did help me understand what to do during the physical practical, and so was less worried about if I made a mistake. I think the VROBL can be improved by adding features that happen in real life, such as adding the pipette tips, throwing away the used tips, and allowing us to make mistakes and troubleshoot it (e.g. if we put the wrong concentration of carbachol)
4.	It helps me in knowing things I need to do during lab
How does your VROBL experience affect your confidence in answering the quiz questionnaire?	
1.	Not much, lesser exposure to quiz during VR. But the analysis of procedure helped alleviate anxiety answering quiz questions.
2.	Virtual is not the same as reality? Virtual gives me more confidence than reality
How can we use VR-based learning to improve your learning in this module?	
1.	Before face to face lab sessions
2.	Although VR is easy to use after we get used to it, I believe it was a bit hard to understand the VR controls the first time I used VR. Therefore I think we need a session to get used to the VR controls and features
3.	An extra exercise before doing real work

Table 1: The intervention group's feedbacks on VROBL and suggestion for improvement.

Discussion

To the best of our knowledge, this is the first report on the impact of the application of a VR pharmacology laboratory as pre-laboratory exercise on students' experience, confidence and knowledge.

Positive feedback on the explanation of the pharmacology laboratory procedure in the VROBL may be the key to the intervention group's increased confidence to explain the experimental procedures correctly. This is in line with the study by Cheesman et al. (2014) in which the students have demonstrated increased confidence in performing the physical laboratory procedures after completing the VR laboratory. Design of VR contents is a major part of the VR implementation, as Jiang et al. (2021) suggested that their participants were more interested and engaged when the content is relevant. The clear and detailed explanation of the laboratory procedures in VROBL could ensure that the participants were able to follow procedures and reduced their anxiety for physical laboratory. In contrast with previous study

showing that technical problems and time needed to learn to navigate the VR applications could cause a loss of interest and engagement (Cheesman et al., 2014), our study showed that participants had gained interest in the organ bath laboratory after VROBL session, which potentially has reduced their anxiety in turn. Notably, intervention group has significantly higher confidence in correctly explaining how to use the apparatus and equipment in the experiment. This may be because VROBL provided a simulated laboratory environment and guided them through the experimental procedures in simulated environment. Notably, most participants in both control and intervention group were not confident (Figure 2; mean score 3.59 vs 3.93) in the understanding of organ bath laboratory concept. This finding indicates that the familiarization with laboratory procedure may not improve the understanding of the theory or principle.

A study by Pan et al. (2016) demonstrated that visual quality and interface performance affect users' sense of presence experienced in the simulation. The glitches and lack of sensitivity of touchpad in VROBL may affect users' overall experience and engagement. Besides, more than half of the participants did not find it easy to navigate and use the VROBL. This might be due to the technical problems and glitches in VROBL. Hence, this should be improved to enhance user-friendliness of VROBL for better user experience.

The lack of significant differences in knowledge quiz scores between the control and intervention groups may be attributed to the small sample size of the study cohort, limited by the constraints of the Covid-19 pandemic and the necessity for physical distancing. Only 35 students were able to participate in the physical laboratory practical sessions, and we had recruited 48.6% (17 out of 35) of the cohort into the study. While most studies showed that VR applications could increase students' interest and motivation in learning, evidence showed that VR applications are not necessarily useful for gaining knowledge, and might even have detrimental effects depending on the design and subject (Cheesman et al., 2014, Hamilton et al., 2021). In this study, we do not advocate for VROBL to substitute the physical laboratory, but instead as a pre-laboratory exercise to supplement the physical laboratory. Undeniably, VR simulations are seldom too animated and lack realism. Hence, VR simulation can only be used as a complement to student learning instead of a substitution (Herga and Dinevski, 2012).

Despite the limitation of small sample size and the technical problems of VROBL, our students highly endorse VROBL as a pre-laboratory exercise, enabling safe practice and fostering familiarity with the physical laboratory. While traditional learning methods remain indispensable, a blended learning approach, integrating digital technology into didactic teaching and laboratory practicals, holds great potential for enhancing students' engagement and learning experience (Balakrishnan et al., 2021).

Conclusion

In conclusion, the participants have demonstrated positive user experience and satisfaction with VROBL developed and used as a pre-laboratory exercise to supplement a physical pharmacology laboratory. While the VROBL did not demonstrate a substantial impact on students' pharmacology knowledge, it enhanced the learning experience and confidence to correctly explain the use of lab equipment and apparatus. The participants believed that VROBL helped to relieve their anxiety by allowing pre-exposure to the physical laboratory procedures. This improvement in student experience and confidence may, in turn, positively influence motivation and overall learning outcomes. Feedbacks gathered from the study's

feedback are important in refining the VROBL and integrating it into the curriculum of health science students in the future.

Acknowledgement

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Development of an Automatic Multiple Choice Question Generation System to Promote Understanding of Programming Concepts

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Abstract
Gagné, a learning psychologist, defined four hierarchical elements of learning skills: problem-solving, rules, concepts, and discriminations. These intellectual skills form a hierarchical structure with problem-solving at the top, followed by rules, concepts, and discriminations. Mastering lower-order skills is essential for higher-order skill acquisition. We apply this theory to programming education. In programming education, students are sometimes given questions that require them to use a programming language to implement an algorithm or create a program that satisfies a certain specification. Such questions belong to the problem-solving type in the Gagné classification. Problem-solving is at the top of the hierarchy and may be difficult for beginning students to solve from the beginning. Ideally, students should start with simpler problems and progress to more complex ones as their understanding deepens. Programming is based on fundamental "concepts" like variables and methods, and "rules" such as syntax for transforming class diagrams into source code. These two skills are the lower level and are important for mastering programming skills. Hence, we have developed an automated system that generates problems promoting a step-by-step understanding of these concepts. The system marks programming concepts such as variables and methods, and outputs multiple-choice questions in PDF format that require the user to select the option that matches the specified concept. The system generated questions for approximately fifty study items that the authors defined. The system's output was improved by reviewing the problem and incorporating the feedback.

Keywords: Programming Education, Intellectual Skills, Multiple-Choice Question

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Introduction

The IT industry has developed remarkably in recent years and the demand for programmers has increased accordingly. In Japan, programming education has become compulsory in elementary and junior high schools since the 2020 academic year, as it allows students to learn logical thinking skills and programming languages (Ministry of Education, Culture, Sports, Science and Technology n.d.). In the high school curriculum, the information subject has been reorganised since the 2022 academic year and students learn the basics of programming through writing programs (Ministry of Education, Culture, Sports, Science, and Technology, n.d.). The environment for teaching IT-related technologies to young people has improved, thus promoting the development of human resources to realise an advanced IT society.

The concept of instructional design is important for creating learning materials. Gagné (1985), a learning psychologist, identified four skills, namely, problem solving, rules, concepts, and discrimination, as elements of a hierarchical structure of learned skills, which he collectively referred to as intellectual skills. In addition, behaviours that are demonstrated after these skills are acquired are shown. Problem-solving is at the top of this hierarchy, followed by rules, concepts, and discrimination. Higher-level skills include several lower-level skills, and the acquisition of higher-level skills requires the mastery of a lower-level skill.
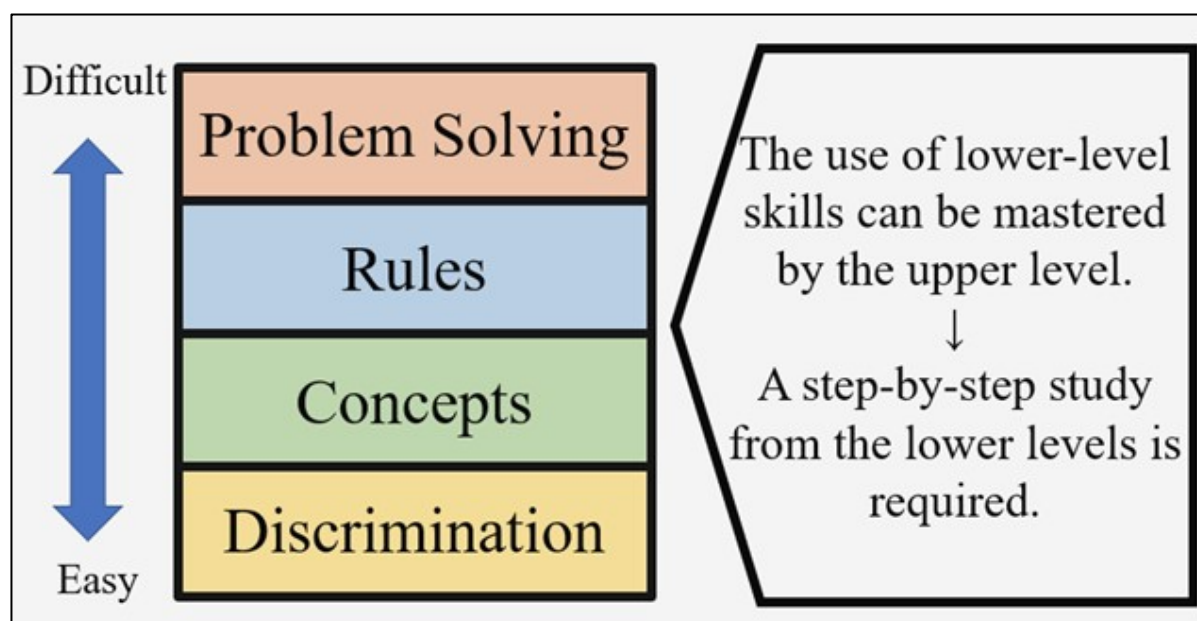
Figure 1: Gagné's intellectual skills and hierarchical structure

This theory has been used to teach programming. Programming tasks, which is typically assigned in programming education, assess the capability of solving problems based on specific requirements and use the concepts and rules acquired in programming. Gagné's cognitive skills enhance the acquisition of problem-solving aptitude. Solving programming problems requires advanced intellectual skills, which renders it difficult for students to solve them while learning and retaining programming concepts in lectures. A better approach would be for students to begin at a lower level and progress to a higher level after they understand the subject better.

Programming comprises primarily 'concepts' such as variables and methods, and 'rules' such as syntax for creating source code from class diagrams and coding styles. The behaviour acquired by learning 'concepts' is 'identification and classification'. Identification refers to the action of detecting two or more objects that have the same characteristics, whereas classification refers to the action of classifying the objects based on the characteristics of the concept. Understanding unknown 'concepts' and 'rules' is necessary for acquiring the ability to create programs.

Exercises should be designed that enable students to learn the concepts and rules. Multiple-choice questions are useful in helping students understand the items. However, since the concepts and rules are at a lower level compared with the problem-solving phase, the questions are simpler and thus require more questions during the exercises. The preparation of such questions by the teacher can be a bottleneck in teaching. Therefore, we designed and developed a system that automatically generates questions to promote a stepwise understanding of these concepts and to smoothly shift to the 'problem-solving' stage.

Related Studies

Efforts to improve programming education are thriving (Makihara et al., 2016; Taguchi et al., 2007; Ichimura et al., 2013). Many methods have been investigated to automate the creation of selection issues.

Tsumori et al. (2009) analysed methods for generating choice questions adapted to learners' comprehension statuses. To help learners understand vocabulary with lexical structures, they attempted to generate questions whose difficulty varied depending on to the conceptual similarity of the vocabulary. The comprehension status was determined by the correctness and difficulty of the question. Furthermore, they assumed that the difficulty level was determined by the combination of the source code used for the question and the question choices.

Funaoi et al. (2010) generated multiple-choice questions for physics mechanics using a specific process, which resulted in the solution to the question. The process was classified into three categories, each of which contained a set of error candidates, and an incorrect answer option was generated by replacing one process with a wrong process. This study focused on generating math and physics questions that require computation through a process involving reading the question text, understanding the situation, selecting the knowledge necessary to solve the question, and performing calculations using the acquired knowledge. Programming was performed without calculations, thus allowing automatic generation to be realised by replacing the computational process. In addition, the questions generated included errors caused by factors other than the concepts.

Nagataki et al. (2008) proposed an automatic generation method for introducing error-detecting-type questions into algorithm learning [9]. They attempted to generate two-choice questions using a C program that described the algorithm as a subject. This study focused on learning algorithms.

Several similar programming concepts exist. Therefore, if we use Tsumori et al.'s method to generate questions, we are likely to generate questions from vocabularies with similar concepts, thus resulting in insufficient variation in the difficulty level. In addition, the difficulty level of a question is assumed to vary not only due to the combination of

alternatives but also due to other factors. Methods such as those of Funau et al. and Nagataki et al.'s, which generate questions by modifying section of an algorithm or calculation process, aim to measure one's comprehension of the processing contents and sequence but are unsuitable for confirming one's comprehension of the concepts. We believe that one of the reasons contributing to the difficulty of programming is the presence of many similar basic programming concepts before algorithms, and that programs cannot be created as desired because of confusion. Hence, these concepts must be clearly distinguished and questions that can systematically deepen one's understanding of these concepts must be provided.

In the current study, we focus on the concepts of programming languages and generate questions that require users to select one among multiple options for each concept. The number of options is varied to increase the degree of freedom of the questions that can be generated. The programming topics covered in this study can be learned by novice programmers to create basic programs.

Study Items in Programming Education

In this study, approximately 50 learning items, as shown in Table 1, were extracted from Java, which is a programming language with procedural and object-oriented paradigms. These items are critical for learning programming and essential for creating programs. They were extracted based on the basic elements of Java: variables, methods, data structures, syntax, and object orientation.

Item Name		
Argument	Comment	OperatorLogic
ArrayElement	CompileAndRun	Parameter
ArrayIndex	Constructor	ParameterArgument
ArrayIndexNumber	ForStatement	ParameterType
ArrayListElementType	Getter	PrimitiveType
ArrayType	Indent	ReferenceType
Brackets	InstanceMethod	ReturnType
CallConstructor	InstanceVariable	ReturnValue
CallInstanceVariableMethod	InstanceVariableDeclaration	ReturnValueDefault
ClassCall	Interface	Scope
ClassDiagram	InterfaceMethod	Setter
ClassDiagramToSourceCode	LiteralString	SourceCodeToClassDiagram
CodingStyleClassName	LocalVariable	StaticMethodCall
CodingStyleInstanceVariable	Method	Variable
CodingStyleMethod	ObjectDiagram	VariableSentence
CodingStyleParameter	OperatorAssignment	
CodingStyleVariable	OperatorComparison	

Table 1: List of extracted study items

Variable

A variable is a number or object managed in a program and whose role is rendered explicit via naming. Because Java is classified as a strongly statically typed language, the type information is important. Therefore, to manage the variables, one must understand their types. In addition, the roles of local variables, instance variables, and other variables change depending on the position of the variable declaration; therefore, the differences among them must be elucidated.

Method

A method defines an operation as a single coherent process and can be referred to as a function. Methods such as variables can be used to define methods. Once a method is defined, it can be reused elsewhere in the program; this eliminates the necessity to write the same process repeatedly, thus rendering the program more readable. To use this method, it must be called. At that time, the necessary information may be passed to the method or the information processed in the method may be returned to the calling program. To create and use one's own methods, minimal understanding of the method definitions, invocation methods, arguments, and return values is required.

Data Structure

Several different types of data exist in the program. In addition to numbers and strings, users can use their own data. Occasionally, a single dataset is used. In such cases, data structures are used. Arrays are one of the most widely used data structures and are used to implement other data structures, such as lists and queues. When arrays are available, more advanced programming tasks can be performed.

Syntax

Syntax is a programming language that is recognised by the programming language via a particular method that describes it. For a series of processes to be recognised as a single behaviour, the processes are enclosed in braces to clarify their scope. In Java, some items require brackets to define blocks when describing classes and methods. To express a string literally, it is enclosed with double quotation marks. The statement that expresses the repetition of processing is classified into three section by semicolons: an initialisation section to set the counter, a conditional section to set the repetition duration, and an iteration section to change the value of the counter variable during the repetition. The section enclosed by a slash and an asterisk, or the section after two slashes to a new line, is regarded as a comment and disregarded during compilation. An operator is an element of syntax used to express a mathematical or logical expression or to assign a value to a variable. All of these are defined as elements of the Java syntax, and their incorrect use will result in compilation errors; therefore, correct notations must be utilised.

Object Oriented

Java supports object-oriented paradigms. An object-oriented paradigm is a paradigm in which real-world entities are regarded as objects with attributes and operations in the memory space, and real-world processing is mimicked by messaging between objects. Classes define the data and methods to be managed by a program. Objects with actual data are created by

instantiating them based on the class information. Classes and objects can be represented as diagrams using (unified modelling language). Therefore, smooth system design and development can be realised by converting objects generated in the classes and methods described in the source code into diagrams and by creating source code from diagrams.

Question Format

Various formats exist in which exercises are assigned (Hidano, 1972). These include the essay format, in which students are instructed to express their opinions regarding a topic based on their knowledge, and a format in which students are instructed to fill in the blanks in a text with appropriate keywords. In this section, we examine the appropriate question formats in programming education for developing the ability to classify concepts and apply rules.

Essay/Description Format

In the essay/description format, students craft an answer to a specific topic based on their knowledge and provide a single deliverable. Many introductory textbooks and university lectures require students to write a program that implements an algorithm that satisfies a specification and a control flow that returns an expected result. These questions are categorised into essay/descriptive formats. When answering questions in this format, the learners are expected to apply the knowledge obtained to create a program. As mentioned in Section 1, this format belongs to the hierarchy of problem solving. When performing exercises, learners should attempt questions that consolidate and deepen their understanding at a lower level and then attempt questions such as example questions.

To deepen the learning of concepts, one may benefit from identifying and classifying them. For rules or principles, one may benefit from applying rules using concepts.

Multiple-Choice Format

A multiple-choice format is typically used to answer conceptual questions. This format is highly objective and easy to implement. Furthermore, it allows learners to include many questions in a single exercise because it does not require a significantly amount of time to perform the exercises. We believe that this question format is appropriate because it allows us to assess the learners' ability to apply the rules by providing options in which identification, classification, and rule applications are performed correctly and those in which they are not.

In a multiple-choice format, either single- or multiple-choice answers may be used. In the multiple-choice format, multiple correct answers can be set and the learner must consider the possibility that another option is the correct answer, which can be laborious. However, the single-choice method simplifies the process of solution identification as one correct answer exists.

Formats Considered in Current Study

The multiple-choice format allows beginners to perform the exercises more easily. In addition, it allows the correct answer to a question in the system to be determined more easily as compared with the written form. Therefore, we designed and developed a system that automatically generates single- and multiple-choice questions.

System Details

The system proposed herein uses source code and class diagrams as choices and materials for the questions. Therefore, a Java source code that can be compiled is provided as input for question generation, and choices are generated based on the compiled source code. Information is provided to the system in string form to generate a question for a specified study item. The output is a JSON file that describes the question information to be constructed when generating the questions and a PDF file if the questions are to be saved. The system user can freely specify the input and output directories.

Figure 2 presents an overview of the proposed system. The processing of the system is divided into three main sections. The first is the input process, which processes the information provided as input to enable question generation; the second is the generation process, which generates questions using data such as the number of choices, number of correct choices, and question text; and the third is the output process, which generates a PDF file from the generated questions and a JSON file containing the information attached to the questions.
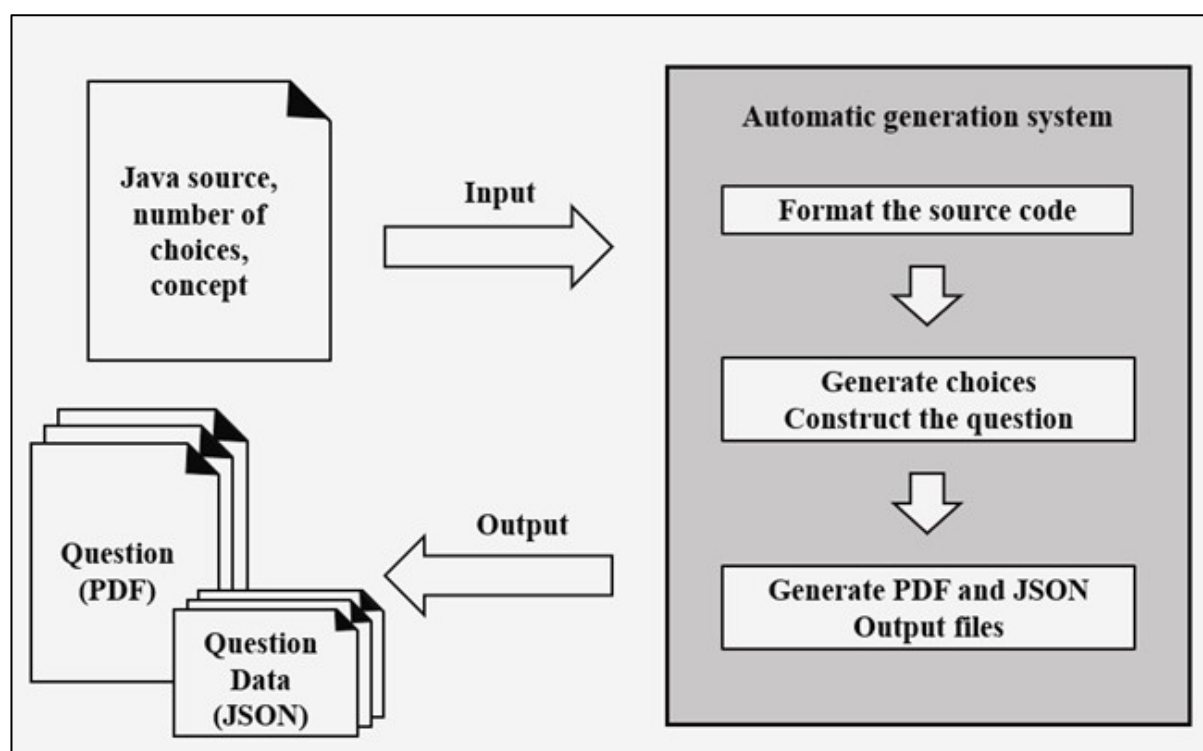
Figure 2: System overview

Input Process

The system uses Java source code and study items as inputs. First, the system determines whether the source code is available for each study item. This verification is performed to avoid cases in which the source code is not available for certain learning items. For example, if no method or constructor is available in the source code for a study item that asks a question regarding a parameter, then the source code cannot be used because a question cannot be generated.

By specifying the directory in which the source code is saved, one can determine whether all internal source codes can be used for the learning item. In this case, a JSON file that shows the mapping between source codes and training items is saved in the directory. This file is rewritten whenever the source code in the directory is added or changed.

The source code used for question generation is formatted after selection to ensure the uniformity of whitespace and line breaks in the source code. Here, the indentation and white space in the source code are standardised.

Generation Process

A well-formed source code is used to perform different generation processes for the different study items. The concepts in the source code are obtained using parsing and regular expressions. Among the concepts obtained, those similar to the target concept are used as candidates for incorrect answer choices. Subsequently, one of the candidates is selected randomly and the source code is shaded or modified such that it becomes grammatically incorrect to generate incorrect answer choices. For questions that use class or object diagrams, the source code is converted such that it can be expressed in these formats; subsequently, shading and text changes are performed.

Figure 3 shows an example of generating alternatives that use the source code. The source code is shaded to indicate the class names, and the source code is modified such that the class names are in lowercase for incorrect choices. In the class diagram, the order in which instance variables are described varies. The generated incorrect answer choices are stored in the list of all choices, and the correct answer choice is inserted at the position of the correct answer number in the list to complete the choices. Using the number of choices, correct answer number, question text, question field, and the source code from which the question is generated, an object representing the question is constructed.
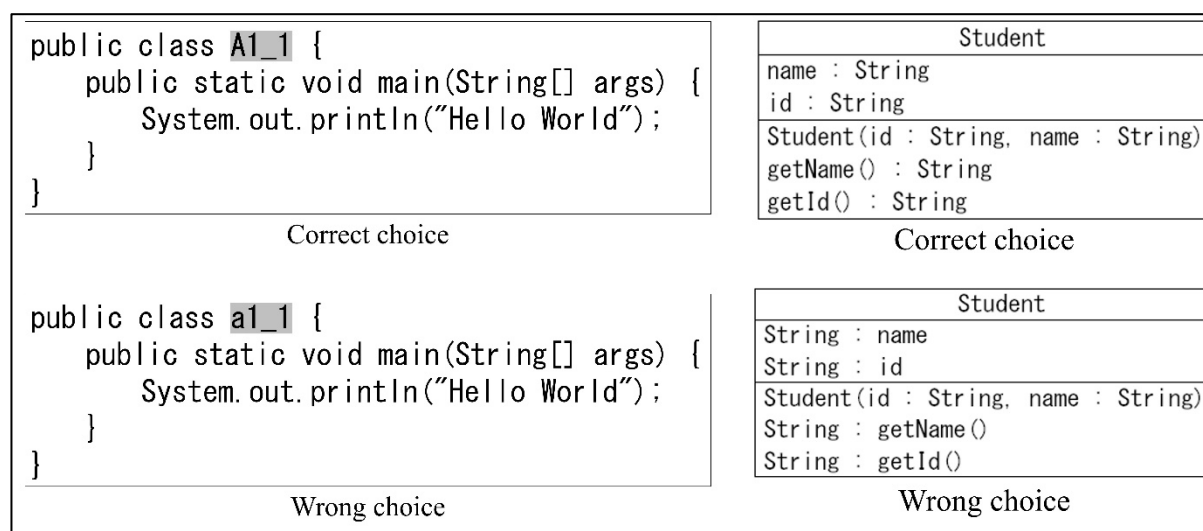


```
public class A1_1 {
    public static void main(String[] args) {
        System.out.println("Hello World");
    }
}
```
Correct choice

```
Student
name : String
id : String
Student(id : String, name : String)
getName() : String
getId() : String
```
Correct choice

```
public class a1_1 {
    public static void main(String[] args) {
        System.out.println("Hello World");
    }
}
```
Wrong choice

```
Student
String : name
String : id
Student(id : String, name : String)
String : getName()
String : getId()
```
Wrong choice

Figure 3: Example of generating choices using source code

Output Process

Based on the question information constructed in the question-generation section, PDF and JSON files containing the question's attached information are generated. Because the content of each study item is different, drawing is implemented for the text, class diagrams, object

diagrams, and source code; subsequently, they are combined to draw the question. Figure 4 shows the selection of the correct class diagram that can be created from the source code.

次のソースコードからクラス図を作成したい。
選択肢から、「正しいクラス図」を選択せよ。

Student. java

```
public class Student {
    private String name;
    private String id;
    public Student(String id, String name) {
        this.id = id;
        this.name = name;
    }
    public String getName() {
        return this.name;
    }
    public String getId() {
        return this.id;
    }
}
```

選択肢
1.

Student
name : String
id : String
Student(id : String, name : String)
getName() : String
getId() : String

2.

Student
name : String
id : String
Student(id : String, name : String)
getName() : void
getId() : void

Figure 4: Example of question generated by proposed system

The JSON file contains information regarding the question field, the source code that generated the question, the number of choices, the number of correct answer choices, the source code for the wrong answer choices, and all other changes to the questions. This file is intended for automating the scoring of exercises and regenerating the same questions.

Evaluation

To confirm that the developed system can generate sufficient questions for the exercises, several source codes were used to generate questions. The number of questions generated was calculated for each of the available study items using the following formula, where 'n' is the number of choices, 'a' the number of candidates for the correct choice, and 'b' the number of candidates for the incorrect choice. Questions with the same options in different orders were regarded as separate questions.

$$Number\ of\ questions = n! \times a \times {}_bC_{n-1}$$

The source code used for the generation was created during a programming course at the Tokyo Denki University. Only two-choice questions were posed in this evaluation.

Each of the five source codes was used to generate questions. Table 1 lists the training items and the number of questions that can be generated. As shown, multiple questions can be generated automatically from a single-source code. The number of questions generated increased significantly with the number of concepts in the source code.

The source code used in this experiment constituted a small proportion of the source code created in the lecture—more source codes will be created in practice. Therefore, the number of questions that can be generated increases with the number of source codes created. This implies that a sufficient number of questions can be prepared even when different exercises are provided in each lecture.

Source code	Number of study items	Number of questions
A1_1.java	12	92
Student.java	28	454
Decoration.java	29	1128
Castable.java	7	50
Cup.java	34	5414

Table 2: Result of generating questions from source code

Conclusion

A system that automatically generates programming exercises using source code was proposed in this study. Because this system can generate many practice questions, it is expected to reduce the cost of creating questions. The questions created were reviewed to determine the appropriateness of the question text and options. Several questions appeared to be inappropriate for presentation to students; therefore, they were modified to render them suitable for presentation. However, owing to the numerous questions generated by the system, only the necessary questions to be used in the exercises were determined. To prevent the generation of questions with similar content or completely different difficulty levels, one

must filter the questions by adding conditions at the time of generation, or implement a system that can select questions to be used from those generated.

Furthermore, data obtained from the exercises must be examined to determine whether the exercises in the question format promote a conceptual understanding of programming and thus realise the ability to create programs. Such data are currently being acquired and analysed.

Acknowledgements

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Generative AI Tutors and Project-Based Learning: Boosting Financial Literacy in Japanese Students

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Abstract

This research study aimed to investigate how generative AI-enhanced Japanese university students' financial knowledge, behavior, and attitude following a 15-week course on personal finance. An electronic instrument was distributed to 49 English as a Foreign Language (EFL) students in two elective courses focused on teaching the basics of personal finance at a private university in Eastern Japan. The survey included the following sections: (1) financial knowledge, (2) financial behavior, and (3) financial attitude. The inquiry results showed that participants' responses to the financial knowledge and behavior subscales in the pre-survey ($M = 7.63$, $M = 2.87$) increased by the end of the course ($M = 8.91$, $M = 3.38$). A paired *t*-test demonstrated that these changes were significant. However, participants' responses to the financial attitude items decreased slightly from the pre-survey ($M = 2.37$) to the post-survey ($M = 2.40$). Responses to the open-ended questions in the post-survey revealed that overall, participants had a positive experience in the course using generative AI for learning and planned to apply what they had learned in their future lives and studies.

Keywords: EFL, Financial Attitudes, Financial Behavior, Financial Knowledge, Generative AI, Japanese University, Personal Finance

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Introduction

In an era where financial landscapes grow increasingly complicated, the importance of financial literacy has never been more evident, particularly among young adults preparing to enter the economic arena. As crucial turning points in the formative years of adult life, universities are responsible for equipping students with the understanding necessary to navigate personal finance confidently and competently. However, conventional pedagogical approaches often need to be revised to engage students and address their diverse learning needs, especially in financial education.

Recognizing this pedagogical gap, this study explores an innovative approach by integrating a generative AI tutor, ChatGPT, into a Japanese university elective class dedicated to financial literacy. The study aims to foster a more interactive and personalized educational experience by combining cutting-edge AI technology with project-based learning. This introduction to generative AI sets the stage for discussing the potential of such AI-powered tools to complement traditional teaching methods and potentially revolutionize the educational landscape regarding accessibility, engagement, and efficacy in fostering financial literacy among university students.

In recent years, issues such as the student loan crisis, housing affordability, and inflation have contributed to financial uncertainty, especially among young people. In Japan, these concerns have been exasperated by factors such as a rapidly aging and declining population, underfunded government social welfare programs, and the elimination of "lifetime employment" that many Japanese companies offered following the Second World War. In order to address these issues, the Japanese government has introduced tax-advantaged retirement accounts and private pension programs that have placed a greater burden on the individual to prepare for and manage one's retirement. Currently, 54% of Japanese household financial assets are kept in simple savings accounts, while only 16% are in bonds, stocks, and funds (Nagata, 2022). In 2022, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) mandated nationwide financial literacy education in high school curricula (Financial Services, Agency, 2023).

While Japan is known worldwide as a highly technological country, the widespread usage of technology for education, especially in pre-tertiary education environments, was quite limited (Aoki, 2010; Funamori, 2017; Latchem et al., 2008). This has changed greatly since the COVID-19 pandemic forced schools to deliver content through technology at all levels. When ChatGPT was introduced to the general public in 2023, educators worldwide raced to understand how to prevent misuse of the technology and appropriately use it for educational purposes. Recent academic studies highlight the potential of AI in education. For example, Villasenor (2022) emphasized integrating AI-generated content in education to enhance learning and critical thinking. Another on using large language models in math education reveals that AI explanations significantly improve learning outcomes, particularly when students attempt problems independently (Kumar et al., 2023). Kumar et al. (2023) concluded that implementing the AI tutor, Khanmigo, in a Silicon Valley school demonstrated its effectiveness in actively engaging students in learning and offered a personalized approach. Finally, Mollick and Mollick (2023) discussed how AI can support evidence-based teaching strategies as a classroom learning catalyst.

These studies underscore the expanding role of AI in education, particularly in enhancing learning experiences and addressing pedagogical challenges. Our research seeks to contribute

to this evolving landscape by examining the integration of ChatGPT in financial literacy education, a critical area for empowering young adults in today's complex financial world.

Research Questions

This preliminary research study aimed to investigate how the use of generative AI-enhanced Japanese university students' financial knowledge, behavior, and attitude following a 15-week course on personal finance. The following research questions were addressed in this study:
1. What are Japanese university students' overall financial knowledge, financial behavior, and financial attitude pre and post a 15-week course on personal finance?
2. What are Japanese university students' intentions to use the knowledge learned in the personal finance course in the future?
3. What are Japanese university students' perceptions of generative AI for learning?

Methodology

Setting and Sample

The study was conducted at a private university in Eastern Japan, focusing on English as a Foreign Language (EFL) students. The university has approximately 11,000 students enrolled in undergraduate and postgraduate studies. There are approximately 1.000 faculty employed at the university across seven faculties. The sample for this study consisted of 51 students enrolled in two semesters of an undergraduate elective focused on learning the basics of personal finance in English.

Participants

Of the 51 students who participated in the elective personal finance course, 49 responded to the pre-survey, while 44 completed the post-survey. A slight majority (52.90%) of the students were female. The rest identified as male. The participants' class standing was as follows: 1st year (19.61%), 2nd year (35.29%), 3rd year (31.37%), and 4th year (13.73%). All participants in the study identified as ethnically Japanese, and Japanese was their first language. While no measure of English ability was given in the class, all students must have a minimum of 550 on the Test of English for International Communication (TOEIC) to take the class. The course catalog identifies the level of the course as B1 Common European Framework of Reference for Languages (CEFR).

Classroom Procedures

A significant aspect of the treatment involved using Chat GPT as a personal finance tutor. This innovative approach was central to the project-based learning component of the course.

Chat GPT was employed as an interactive, AI-driven tutor specifically tailored to assist students in understanding the foundations of personal finance. Its role facilitated learning by providing explanations, answering queries, and offering guidance on various financial topics. This approach aimed to create a more engaging and personalized student learning experience.

Students were tasked with creating Google Sites web pages as part of their assessment. These web pages served as a platform for students to demonstrate their understanding and

application of personal finance concepts. Chat GPT played a crucial role in this process by assisting students in conceptualizing, designing, and populating their web pages with relevant content. This task assessed students' knowledge and ability to communicate and present financial concepts in a digital format effectively.

Another innovative use of Chat GPT was developing speaking tasks. Students utilized the AI tutor to help them prepare and refine their spoken presentations on personal finance topics. These speaking tasks were recorded and uploaded to YouTube, providing a dynamic and accessible medium for showcasing their learning.

The YouTube videos of the speaking tasks were embedded into the students' Google Sites webpages. This integration presented each student's learning journey, combining written content, interactive elements, and video presentations. Using Chat GPT in this process ensured that students had continuous support in developing their written and spoken communication skills, which are crucial for effectively conveying an understanding of basic financial concepts.

This expanded use of Chat GPT as a personal finance tutor represents a novel approach in educational settings, particularly in enhancing students' financial literacy. The course provided students with a multifaceted educational experience by incorporating AI-driven tools in project-based learning, combining traditional learning with innovative technology-driven methods.

Instrument

The primary instrument used for data collection was a Personal Finance Questionnaire, administered before and after the course using Google Forms. This questionnaire assessed three key areas: financial knowledge, attitudes, and behavior (Appendix). The questionnaire included a range of question types, such as multiple-choice, Likert-scale, and open-ended questions, to capture a comprehensive view of students' financial literacy. The items for the questionnaire were adapted from a previously validated survey instrument (Potrich et al., 2020). The items were translated into Japanese from English by a researcher who is a native speaker of Japanese and possesses a high level of ability in English. A second native Japanese speaker checked the translation for ease of understanding.

Data Collection and Analysis

The data were collected during the Spring and Fall semesters of 2023 (April – December). The researchers created a Google Forms document administered to students through the university's learning management systems. The survey and cover letter were in Japanese and English. The cover letter gave potential participants information regarding the study and their rights as research subjects. It was made clear to the students that participation was voluntary and would not affect their course evaluation.

After the data collection phase, the researchers transcribed the data into an Excel spreadsheet for further analysis. Frequencies and descriptive statistics were calculated for all the scales and subscales. In addition, a paired t-test was conducted to investigate changes in responses between the pre-and post-survey.

Results

Research Question 1a: Financial Knowledge

The Financial Knowledge portion of the survey contained 12 items. In the pre-test, the participants' mean score was 7.63, which increased to 8.91 in the post-test. As Figure 1 shows, the most frequent pre-test score for the participants was a 5, while 9 was the most common in the post-test.
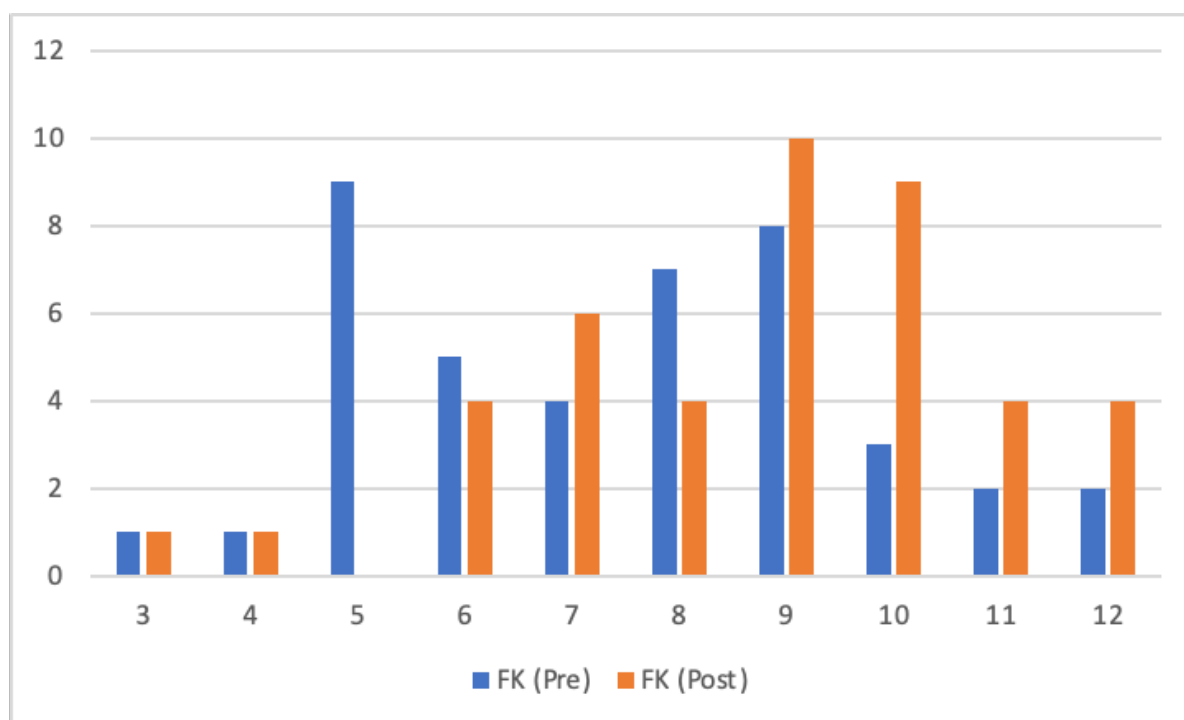

Figure 1: Distribution of Scores for Financial Knowledge

The most common questions missed in the pre-test were:

Imagine that you have received a donation and that you will keep the money in your safe at home. Considering that inflation is 5% per year, after one year, you will be able to buy:
      a.   Less than 5 years (correct answer)
      b.   From 5 to 10 years
      c.   Over 10 years
      d.   Do not know

Jon acquires a loan of $1,000 that has an interest rate of 20% per year compounded annually. If he does not make payments on the loan and at that interest rate, how many years would it take for the amount due to double?
      a.   Less than 5 years (correct answer)
      b.   From 5 to 10 years
      c.   Over 10 years
      d.   Do not know

Both questions were concerned with interest rates and compound growth. The latter was also the most frequently missed in the post-test.

A Paired Sample *t*-test was calculated to determine differences in pre- and post-scores to the Financial Knowledge test. The results of this analysis showed that participants' scores on Financial Knowledge increased significantly from the pre-test (M = 7.63, SD = 2.51) to the post-test (M = 8.92, SD = 2.30; $t(48) = 2.79$, $p = .0075$).

Research Question 1b: Financial Behavior and Attitude

The highest mean values were associated with Item 14 on Financial Behavior, with over 50% of participants in the pre-survey and over 72% in the post-survey indicating they *almost always* or *always* personally oversaw their finances. The greatest change between pre- and post-survey means in this category was seen in Item 15: "I set long-term financial goals and strive to achieve them."

Table 1: *Pre and Post Means and Standard Deviations of Financial Behavior*

	Pre		Post	
Item	*M*	*SD*	*M*	*SD*
13. I save money regularly to achieve long-term financial goals, such as educating my children, purchasing a home, and retiring.	2.43	1.06	2.86	1.17
14. I personally oversee my financial affairs.	3.45	1.29	4.00	.99
15. I set long-term financial goals and strive to achieve them.	2.73	1.18	3.30	1.02

Note. Scale ranging from 1 – *never* to 5 – *always*.

Responses to Items 16 and 18 on the Financial Attitude scale decreased slightly between the pre- and post-survey. The only item to increase was 17, where more participants disagreed with the statement, "Money is meant to be spent" in the post-survey compared to the pre-survey.

Table 2: *Pre and Post Means and Standard Deviations of Financial Attitude*

	Pre		Post	
Item	*M*	*SD*	*M*	*SD*
16. I find it more rewarding to spend money than to save for the future.	2.69	1.04	2.60	1.26
17. Money is meant to be spent.	1.97	.98	2.02	1.17
18. I tend to live today and let tomorrow happen.	2.73	1.10	2.59	1.30

Note. Scale ranging from 1 – *strongly agree* to 5 – *strongly disagree*.

A visual comparison of the pre- and post-survey means showed that the difference in Financial Attitudes before and after the course was negligible in comparison to Financial Behavior (Figure 2). A paired *t*-test was used to determine if the difference between pre- and post-suvey means significantly differed for each factor. It was found that the pre-survey responses to Financial Attitudes (M = 2.87, SD = 1.25) increased significantly in the post-survey (M = 3.38, SD = 1.15; $t(48) = -2.79$, $p = .0076$). There was no significant difference

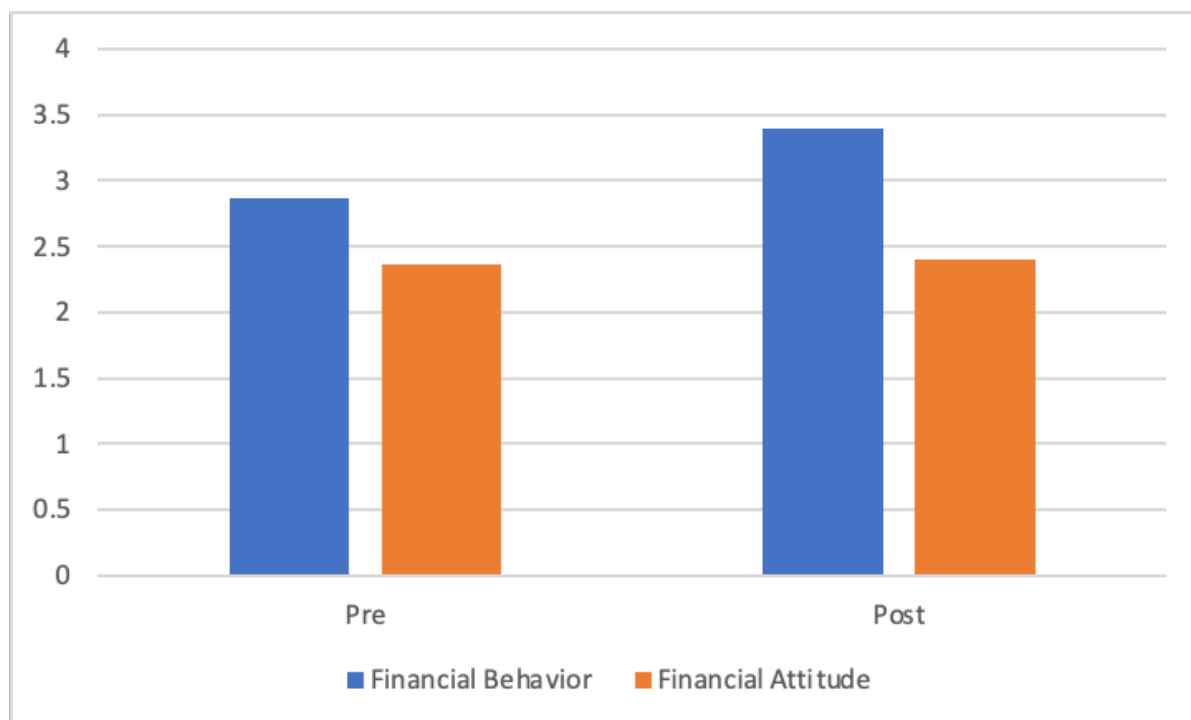between pre- (M = 2.37, SD = 1.08) and post-survey (M = 2.40, SD = 1.26) responses to the Financial Attitude scale.

Figure 2: Comparison of Pre- and Post-Survey Means for Financial Behavior and Attitude

Research Question 2: Use of Financial Knowledge

Information was gathered from participants about how they would use the information they learned in the course in the future. A thematic analysis of the open-ended responses allowed the researchers to categorize the information into three themes: 1. Reflective Spending Habits, 2. Strategic Financial Planning, 3. Interest in Financial Instruments.

The first of these, Reflective Spending Habits, was evident in responses about budgeting, impulse spending, and being thoughtful in how money was spent and saved. Participants also expressed an interest in Strategic Life Planning in their discussion of taxes, insurance, and retirement preparation. The last theme that emerged was Interest in Financial Instruments. Many responses focused on specific financial instruments introduced in the course, such as the Nippon Individual Savings Account (NISA) and the Individual Defined Contribution Pension (iDeCo).

Research Question 3: Perceptions of Generative AI

Participants were asked to identify the positive and negative aspects of using Chat GPT for learning. Based on the provided responses, three overarching themes emerge regarding participants' perceptions of the advantages of using ChatGPT for financial information. The first was Convenience and Accessibility. Participants appreciated the ease with which they could obtain information and how they could ask unlimited questions and receive feedback. Another theme was that of Educational Value. Participants valued ChatGPT's ability to explain unfamiliar topics and vocabulary in a simple way. In addition, the tool was seen as a valuable resource in increasing their ability to manage their personal finances. The final theme was Efficiency and Customization. The tool was seen as helpful in providing specific

advice to the financial questions asked and scaffolding the information to the students' level of financial knowledge and English proficiency.

Three further themes regarding the negative aspects were identified in the participants' open-ended responses. The primary concern was that of Uncertainty and Reliability. Participants reported that ChatGPT could often provide false answers to their queries and that the data was not up to date. While Customization was identified as a positive theme, several responses highlighted the negative. Some students complained that the tool only provided general advice about their financial circumstances. Finally, many participants expressed concern that the tool posed a risk of Overreliance and Laziness. They acknowledge that because of the ease with which one could obtain information using ChatGPT, learners might lose the ability to research and make decisions.

Discussion

The results of this study highlight the significant role of generative AI, specifically Chat GPT, in enhancing the financial literacy of Japanese university students. Using Chat GPT as a personal finance tutor in a project-based learning environment not only improved students' financial knowledge, as evidenced by the increased scores in the post-test but also positively influenced their attitudes and behaviors towards personal finance.

1. Enhanced Learning Experience: The integration of Chat GPT allowed for a more interactive and personalized learning experience. Students could engage with complex financial concepts in a more accessible and user-friendly manner. Creating Google Sites webpages and developing speaking tasks, supported by Chat GPT, provided practical applications of their learning, reinforcing their understanding of personal finance.

2. Digital Literacy and Communication Skills: The project-based approach, including creating webpages and video presentations, also enhanced students' digital literacy and communication skills. These are essential competencies in the modern digital world, further adding value to the educational experience provided by the course.

Limitations

While the study provides valuable insights, it has limitations. The sample size, though diverse, was limited to students from specific universities in Japan, which may affect the generalizability of the findings. Additionally, the study focused on short-term outcomes; thus, long-term financial knowledge and skills retention still need to be explored.

Implications for Practice

The findings suggest that incorporating AI-driven tools like Chat GPT in educational settings can be highly effective, especially in subjects like personal finance that require a blend of theoretical knowledge and practical application. Educators and curriculum designers might consider integrating similar AI tools to enhance learning experiences in various disciplines.

Need for Future Research

1. Long-Term Impact: Future research should assess the long-term impact of AI tutors on students' knowledge retention and the sustained change in their financial behaviors and attitudes.

2. Broader Applications: Exploring the application of AI tutors in other subjects and educational contexts would provide a more comprehensive understanding of their effectiveness and versatility.

3. Comparative Studies: Comparative studies involving different AI platforms and teaching methodologies could offer deeper insights into the most effective strategies for integrating technology in education.

4. Cultural and Linguistic Adaptations: Given this study's cultural and linguistic specificity, research in diverse cultural and linguistic settings would be valuable to understand the broader applicability of AI tutors in global educational contexts.

In conclusion, this study underscores the potential of AI-driven tools like Chat GPT in revolutionizing educational methodologies and outcomes. The positive results in enhancing financial literacy among Japanese university students pave the way for further exploration and innovation in education technology.

Conclusion

This study explored the impact of generative AI tutors, specifically Chat GPT, on enhancing the financial literacy of Japanese university students. The findings clearly indicate that integrating AI-driven tools in a project-based learning environment significantly improved students' understanding of personal finance. Using Chat GPT as a personal finance tutor facilitated a deeper grasp of financial concepts and encouraged a more engaged and interactive learning experience.

Creating Google Sites webpages and developing speaking tasks, supported by Chat GPT, demonstrated the practical application of financial knowledge. This approach enhanced students' financial literacy and developed their digital literacy and communication skills, preparing them for the demands of the modern, technology-driven world.

While the study presents promising results, it also highlights the need for further research. Future investigations should focus on the long-term effects of AI tutors on knowledge retention, the application of AI in diverse educational contexts, and the effectiveness of different AI platforms in various learning environments.

The implications of this research are far-reaching. It suggests a paradigm shift in educational practices, where AI-driven tools like Chat GPT can be pivotal in enhancing learning outcomes. As the field of education technology continues to evolve, integrating such innovative tools could become a standard practice, offering students a more personalized, engaging, and effective learning experience.

In conclusion, the study provides compelling evidence of the benefits of using generative AI tutors in education, particularly in specialized subjects like personal finance. It opens up new

avenues for research and practice, encouraging educators and policymakers to embrace AI technologies in crafting the future of education.

Appendix

Survey Instrument (Potrich et al., 2020)

Financial Knowledge

Item Code	Item	Answers
Item 1	Suppose you had €100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow? You do not make any other deposits or withdraw any money from this account.	More than €102.*; Exactly €102; Less than €102.; Do not know.
Item 2	Imagine that you have received a donation and that you will keep the money in your safe at home. Considering that inflation is 5% per year, after one year, you will be able to buy:	More than today.; Exactly the same as today.; Less than today.; Do not know.
Item 3	Typically, which asset has the biggest fluctuations over time?	Savings.; Stocks.*; Bonds.; Do not know.
Item 4	Do you think that the following statement is true or false? Buying a single company stock usually provides a safer return than a stock mutual fund.	True.; False*; Do not know.
Item 5	Suppose you took out a loan of $10,000.00 to be paid after 1 year and the total cost of interest is $600.00. The interest rate you will pay on this loan is:	0.3%; 0.6%; 3%; 6%*; Do not know.
Item 6	Suppose you saw the same TV in two different stores for the starting price of $1,000.00. Store A offers a discount of $150.00. while store B offers a discount of 10%. What is the best alternative?	Buy at store A ($150.00 discount).; Buy at store B (10% discount).; Do not know.
Item 7	Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, would you be able to buv more than, exactly the same as, or less than todav with the money in this account?	More than today.; Exactly the same as today.; Less than today.; Do not know.
Item 8	Suppose you borrowed $100.00 from a friend and after a week paid $100.00. How much interest are you paying?	0%*; 1%; 2%; Do not know.

Item 9	An investment with a high rate of return will have a high rate of risk. This statement is:	True *; False; Do not know.
Item 10	When inflation increases, the cost of living goes up. This statement is:	True.*; False.; Do not know.
Item 11	John acquires a loan of $1,000.00 that has an interest rate of 20% per year compounded annually. If he does not make payments on the loan and at that interest rate, how many years would it take for the amount due to double?	Less than 5 vears.*; From 5 to 10 years.; Over 10 years.; Do not know.
Item 12	It is possible to reduce the risk of investing in the stock market by buying a wide range of shares. This statement is:	True *; False; Do not know

Financial Behavior

Item Code	Description	Scale
Item 13	I save money regularly to achieve long-term financial goals, such as educating my children, purchasing a home, retiring.	1 = Never, 2 = Almost never, 3 = Sometimes, 4 = Almost always, 5 = Always
Item 14	I personally oversee my financial affairs.	
Item 15	I set long-term financial goals and strive to achieve them.	

Financial Attitude

Item Code	Description	Scale
Item 16	I find it more rewarding to spend money than to save for the future.	1 = Strongly agree, 2 = Agree, 3 = Indifferent, 4 = Disagree, 5 = Strongly disagree
Item 17	Money is made to spend.	
Item 18	I tend to live today and let tomorrow happen.	

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Transformative Effect of Reading Activities on Critical Incident Scenarios in Fostering Cultural Empathy

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Abstract

In response to the evolving political and social landscape of the 21st century, the focus in foreign language (FL) programs has transitioned from proficiency across skills to "transformation". A key avenue through which this transformation can be achieved lies in FL classrooms, where the cultivation of "cultural empathy" is being pursued. However, this integration of language studies and cultural content, designed to stimulate self-reflection, critical analysis, and emotional engagement, presents notable challenges, particularly at introductory levels and in the context of Japanese as a Foreign Language (JFL) environment, due to learners' limited linguistic abilities, educators' hesitancy to use L1, and the lack of target-culture communities. To address this, the teacher-researcher conducted action research in an Elementary Japanese course: exploring students' transformation towards increased cultural empathy through a two-step exercise involving reading scenarios in Japanese and subsequently composing reflections and discussions in English. The reading materials explored value conflicts between Japanese people and individuals from different cultures. Qualitative thematic analysis of student reflections using MAXQDA (2022) revealed discernible patterns and outcomes indicating a sign of cultural empathy development. Notably, perspective transformation surfaced, especially in the context of punctuality. While the activity might not wholly transform students, it serves as a gateway to cultivating fundamental cultural empathy skills. Despite the limitations of this case study, it indicates that reading and discussion could effectively foster both FL skills and cultural empathy without the risk of real-world consequences.

Keywords: Transformative Language Learning and Teaching, Cultural Empathy, Critical Incident, Reading, Japanese as a Foreign Language (JFL)

Introduction

The realm of foreign language (FL) pedagogy finds itself at the crossroads of a significant paradigm shift in response to the multifaceted challenges posed by the political, social, and technological landscape of the 21st century (Kumaravadivelu, 2003, Paesani, 2016, Leaver et al., 2021, and Tohsaku, 2021). The dominance of communicative language teaching (CLT), particularly emphasizing the functional usage of language in oral communication, has characterized FL education since the 1990s. However, the contemporary context demands our attention to the profound influence of technological innovations, exemplified by machine/AI translation and learning apps, which, while fostering language learning, concurrently challenge the significance of FL classes, where language proficiency development has been the focal point (Tohsaku, 2021; Bourns, 2020). Amidst these shifts, the pivotal question emerges for language educators: what skills should we cultivate in future generations to ensure their resilience and success in the 21st century through FL education?

Aoun's (2017) "humanics framework" answers this question by highlighting essential human literacy skills, positioning them as indispensable tools to render individuals "robot-proof." Creativity, entrepreneurship, system thinking, empathy, cultural agility, and teamwork stand out as crucial components of this framework. Of particular significance is the notion of "cultural agility," elucidated by Aoun's colleague Paula Caligiuri as "the mage-competency that enables professionals to perform successfully in cross-cultural situations" (Aoun, 2017, p.70). The World Economic Forum's (2016) ranking reinforces these assertions, highlighting the demand for skills such as complex problem-solving, critical thinking, creativity, and, notably, empathy—the linchpin ability projected to be the most crucial in 2030 (OECD 2017, 2018).

This places FL classrooms in a unique position to effectively develop empathy and cultural agility skills (Bourns, 2020). "Empathy," defined as "feeling in oneself the feelings of others" (Strayer & Eisenberg, 1987, p. 391), takes center stage in this scenario, especially in the realm of cross-cultural situations, encapsulated as "cultural empathy." This form of empathy becomes a skill that FL classrooms can adeptly cultivate, considering the intrinsic connection between language and culture in shaping individual and societal perspectives.

Cultural empathy, however, is not a knowledge-based acquisition; rather, it necessitates a transformative shift in perspective. Within the transformative language learning and teaching (TLLT) framework, as outlined by Leaver et al (2021), the power of foreign language learning to instigate shifts in learners' "thinking, behavior, acceptance of the other, values, mindset, and/or emotion" is underscored (p. 16). Consequently, TLLT, with its focus on fostering personal change, stands out as an effective avenue for nurturing an increase in one's cultural empathy.

This action research delves into the intricacies of transformation in the context of culture and language learning, aiming to unravel how cultural empathy can be fostered and integrated into FL classrooms. As a tangible outcome of this action research, the teacher-researcher presents a classroom reading activity conducted in an Elementary Japanese II course (JPN 102) within a Japanese as a foreign language (JFL) context. Through this study, the teacher-researcher aspires to contribute to the ongoing dialogue surrounding transformative learning in 21st-century FL pedagogy and provide a practical exemplification of fostering cultural empathy in the FL classroom.

Literature Review

Increased Cultural Empathy as a Form of Transformation

Transformative learning, rooted in Mezirow's adult learning theory from 1978, distinguishes the learning experiences of adult and child learners, as "adults reevaluate previously held beliefs and attitudes and begin to interpret experiences in a new way" (Johnson, 2015, p. 18). In the context of Foreign Language (FL) education, this process facilitates a transformation in learners' perspectives and behaviors by exposing them to diverse sociolinguistic and cultural norms. One notable transformation that could occur in FL classrooms is the development of "increased cultural empathy." Wang et al (2003) define cultural empathy as the manifestation of empathy in cross-cultural settings. A parallel terminology "(inter)cultural awareness," has been used to refer to one's cultural sensitivity in cross-cultural situations. However, Zhu (2011 p.116) underscores the importance of "empathy" by asserting that "the mere realization of cultural awareness is far from sufficient... language learners in cross-cultural situations … should try by every means to cultivate empathetic concepts and precepts in the process of foreign language learning." Cultural empathy is not an innate ability but "a learned ability" (Ridley & Lingle, 1996, p. 32) through bi/multi-cultural experiences. The development of empathy requires individuals to internalize others' emotions and concerns, a depth of understanding that transcends the knowledge acquisition of different cultures. Hence, "disorienting dilemma," as originally proposed by Mezirow (1978), which is considered as a cross-cultural incident that "shakes learners' belief systems and causes them to reflect, dissect, and analyze" in TLLT (Leaver et al 2021:17), plays a significant role in cultivating cultural empathy.

Disorienting Dilemma and Critical Incident as a Trigger of Transformation

While many cases of learner transformation presented in TLLT occur in study-abroad or cross-cultural communication settings, Leaver et al (2021 p. 17) suggests that even in the observation of culture from afar, language learners can experience disorienting dilemmas. This is particularly relevant for FL educators teaching abroad, where there might be limited interaction with the people and culture of the target language, as in the present research case involving learners with minimal exposure to Japanese culture. There are many ways to observe the target culture from the outside, but Boris (2017) mentions that personal narratives resonate with audiences, making them relatable and memorable. Consequently, they hold the potential to create more immersive experience. It indicates that narratives have the potential to cause strong emotional conflicts and/or to increase empathy in one's mind. Thus, the present research draws on the concept of critical incidents, akin to those used in culture assimilators which was popular in the 1960-90s. A critical incident refers to a situation where there is a communication problem between people of different cultures due to a lack of understanding of each other's cultures (Kleinfeld, 1998; Tomalin and Stempleski, 1993). A culture assimilator can be described as "programmed learning experience designed to expose members of one culture to some basic concepts, attitudes, role perceptions, customs and values of another culture" (Knop, 1976; Fiedler, Mitchell and Triandis, 1971) and consists of three parts; a critical situation, four possible interpretations, four feedback explanations. The purpose of this program is to acculturate a person so that there are correct and incorrect choices of response to the specific critical situation. It is worth noting that while critical incidents were historically employed for acculturation, this study aims to leverage them for gaining diverse perspectives and fostering empathy and respect for different cultures.

Kleinfeld's (1998) utilization of critical incident scenario for teacher training in cultural diversity demonstrated that engaging in discussions surrounding these cases elicited emotional and intellectual responses from teachers, fostering a deeper understanding of the cases and each other's experiences. This finding suggests that a discussion format can be effective not only in building empathy and cultural understanding related to the target culture but also towards the cultures of students' home countries and communities. Similarly, previous research has incorporated critical incidents into foreign language (FL) classrooms to enhance cross-cultural understanding, particularly in intermediate or advanced levels (Stakhnevich, 2002). However, it is noteworthy that while the effectiveness of discussions based on critical incident stories is implied, there is a scarcity of research utilizing critical incidents as materials for introductory-level courses in the target language.

Another Challenge FL Educators Face When Fostering Cultural Empathy

Certainly, fostering cultural empathy in the FL classroom requires the incorporation of cultural content. Although cultural content has become even more significant (Paesani 2016, Leaver et al 2021), research by Sercu (2005) sheds light on the hurdles confronted by FL instructors, especially in introductory level courses, when integrating culture into FL classrooms. These challenges include limited student language proficiency, time constraints, curriculum limitations, and teacher reluctance to use the native/common language in class. Despite these obstacles, insights from Garrett-Rucks (2013) and Li, Mazzotta, and Liu (2022) underscore the effectiveness of employing English for meaningful cultural reflections in FL classrooms.

Motivation of the Present Study

A substantial body of research exists within the framework of Transformative Language Learning and Teaching (TLLT) and on the topic of cultural sensitivity and cultural empathy, there is a dearth of studies focusing on the development of cultural empathy as a distinct form of transformation. Additionally, limited research has explored the potential of critical incidents to serve as catalysts for disorienting dilemma/transformation in the context of learning target language as a foreign language remains under-investigated, signaling an opportunity for further inquiry. Moreover, the challenge of integrating culture learning in FL classrooms, especially at the elementary level, calls for innovative approaches and materials to facilitate cultural learning in the early stages of FL education. The present study, therefore, proposes a balanced approach to tackle these challenges: the implementation of critical incidents as reading materials in the target language, followed by in-depth discussions in English and aims to investigate the potential of utilizing a reading and discussion activity centered around critical incident scenarios to amplify students' "cultural empathy." The research questions (RQ) are as follows:

1. How does engaging in a reading activity focused on critical incident scenarios influence the development and augmentation of cultural empathy?
2. Does any sort of transformation happen to students through the activity?
3. Does this activity effectively tackle the challenges associated with culture learning in introductory-level language courses?

Method

Participants and Course

The present study was conducted as action research in a classroom setting. The study targeted thirty-eight undergraduate students enrolled in a Japanese elementary-level course (JPN101 and JPN102) at a university in the southern United States. Students cultural/language background are diverse, encompassing individuals from the U.S., Europe, Africa, East Asia, Southeast Asia, and the Middle East. Notably, the majority were East Asian students. They pursued diverse non-language related majors. The course was offered during the second semester of the 2022-2023 academic year to students who had no previous experience learning Japanese before the first semester. The course consisted of two 75-minute in-person sessions and one 50-minute Zoom meeting per week. The instructor primarily used English to explain target grammar items, while students had ample opportunity to engage in Japanese with their peers during the lessons.

Learning Material

The course utilized the Genki textbook, covering lessons L1-5 in first semester and L6-10 in second semester. Therefore, to enhance students' understanding of the topic and language forms they learned in the lesson, each narrative used as reading materials was carefully chosen to explore themes pertinent to lessons 6-10 of the Genki textbook. It consisted of scenario, each comprising 400-500 characters in Japanese and explored value conflicts between Japanese people and individuals from different cultures. Topics included educational system - "the meaning of silence in class," Family & kinship terms - "marriage between a Japanese and American," Foods in Japan - "chopsticks manners and taboos," Traditional cultures - "tradition and gender issues," and public transportation - "punctuality and flexibility." These narratives were thoughtfully reconstructed by the teacher-researcher to align with the proficiency levels of the students as the scenario were sourced from diverse outlets, including news, social media, personal connections of the teacher-researcher, and research articles.

Image 1: An Example of reading material

Procedures

The teacher-researcher conducted the reading activity at the end of each textbook lesson in-person, with each session taking 30-40 minutes of the regular class time. The session commenced with a 10–15-minute reading of the selected text on an online learning management system called Canvas, followed by a 5-minute Q&A session to ensure participants had a precise understanding of the presented scenarios. Subsequently, participants were given 15 minutes to engage in reflective writing, guided by questions formulated by the teacher-researcher. For lessons 6-7, this reflective process was followed by an enriching class discussion. While initial plans included a class discussion format for lessons 8-10 as well, time constraints and other commitments led to a modification where students read their peers' comments only. Despite this adaptation, valuable exchanges were facilitated, contributing to the overall success of the activity. At last, participants were engaged in overall reflective writing about the reading and class discussion/peer comments. Additionally, at the end of the semester, participants were tasked with crafting a 250-word reflective essay based on their cumulative experiences with the reading activity. The languages used in each segment of the activity are in image 2 below.

Session	Date	Content
Lesson 6	Jan 23	the meaning of silence in class
Lesson 7	Feb 6	marriage between a Japanese and American
Lesson 8	Feb 20	chopsticks manners and taboos
Lesson 9	Mar 1	tradition and gender issues
Lesson 10	Mar 29	punctuality and flexibility
End of semester reflection	Apr 3	Semester reflection

Table 1: The Schedule and Content of reading and discussion activity
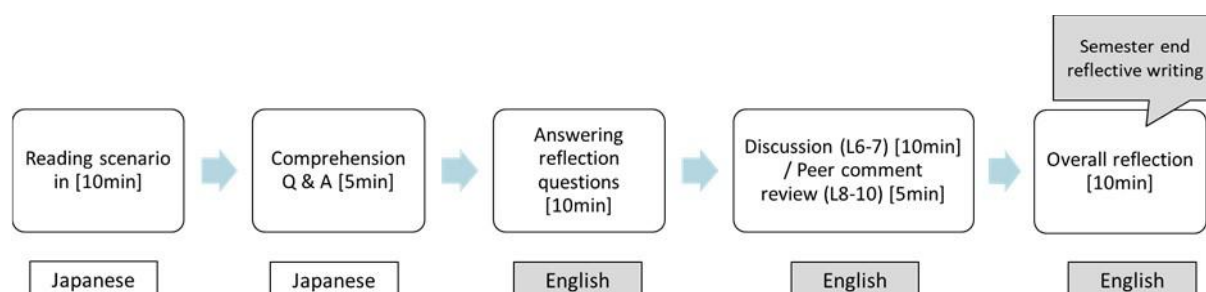
Image 2: Language usage in each segment of the activity

The rationale behind employing reflective writing lies in its ability to unveil internal thoughts, provide a platform for reserved students to share, and aligns with recent research suggesting its transformative impact in language classrooms (Crane 2018, De Santis & Willis 2016, Johnson 2015). The utilization of a discussion format has proven to be effective in fostering connections and empathy among students within the classroom setting, as highlighted by Kleinfeld (1998). This format not only provides a platform for students to elaborate on their opinions initially shared on the Canvas discussion board but also serves as an avenue for a deeper exploration of Japanese culture and mutual understanding of each other's diverse cultural backgrounds. Particularly in introductory-level language courses, the role of the native language (L1) is pivotal in the process of meaning-making. Recognizing that the primary focus of this activity is on perspective transformation rather than the development of language skills, the choice of English as the common language in the classroom discussions becomes paramount. This strategic use of English promotes equal

participation among students, irrespective of individual differences in Japanese proficiency levels, ensuring an inclusive and enriching learning environment.

Data Collection and Analysis

Data collection took place in the early months of 2023, spanning the Spring semester. Out of the 38 initially targeted students, 34 consistently attended all sessions, and their responses form the focus of our analysis. Since transformation is a process that unfolds over time, semester-end reflective writings (minimum 250 words) serve as the primary source for potentially observing and analyzing transformation. This approach allows us to capture the evolving nature of students' experiences and perceptions throughout the course.

The teacher-researcher conducted thematic analysis, adhering to Braun and Clarke's (2006) approach. The qualitative research software, MAXQDA (2022), was employed for efficient organization and analysis of the rich qualitative data, facilitating a rigorous exploration of the themes emerging from students' reflective writings. Recognizing the intricate and subjective nature of personal transformation, the study acknowledges the diverse backgrounds and experiences of these 34 participants. Given the individualized and context-dependent character of transformation, the study refrains from seeking nomothetic generalization and instead opts for a qualitative research method to delve into the depth of each student's unique experience. The modest sample size further underscores the appropriateness of qualitative methods. The study prioritizes transferability, which as defined by Duff (2006) and Lincoln and Guba (2009), hinges on fittingness—the congruence between the original study's context and the potential application in other settings.

Results and Discussion

In order to answer the research questions (RQ), both quantitative and qualitative data are presented; accordingly, all names used for students' comments are pseudonyms.

The discerned patterns found from the data are as shown in table 2 and 3. Numerous students affirmed that they deepened understanding of Japanese culture and classmates' cultures, concurrently reevaluating their own values. Additionally, some recognized the importance of empathy. The comments labeled as "self-reflection on one's own values" and "importance of putting oneself in other's shoes" are the vital components of "cultural empathy," as defined by Zhu (2011) and Ivey, Ivey, & Simek-Morgan (1997), seeing the world through another's eyes and feeling and experiencing their internal world without mixing one's own thoughts and actions with those of the client. Thus, this activity successfully offered opportunities for students to develop and increase their cultural empathy.

Code	Count
Knowledge of Japanese culture and classmates' cultures	20
Self-reflection on one's own values	12
Importance of putting oneself in other's shoes	7
Importance of clear communication	7

Table 2: Participant's reflection on overall learning outcome throughout the semester

As shown in table 3 below, notably, the semester-end writings revealed genuine emotional responses to the scenarios, underscoring the enduring impact of these narratives on students'

feelings and reflections. As Boris (2017) stated, personal narratives resonate with audiences, making them relatable and memorable and it seems to be true in this case too.

Code	Count
Empathy (L6 - the meaning of silence in class)	6
Sadness (L7 - marriage between a Japanese and American)	2
Anger (L9 - tradition and gender issues)	9
Surprise (L10 - punctuality and flexibility)	5

*No participants mentioned emotions they recall from L8 reading

Table 3: Emotions participants recall about each critical incident scenario

As for RQ1 regarding the impact of critical incident scenario on the development of cultural empathy, this reading activity seemed to serve as a platform to foster fundamental cultural empathy skills, immersing students in the emotional journey of the story's characters. The emotional resonance many students demonstrated with the characters suggested a pre-existing level of cultural empathy before taking this course. Nonetheless, certain comments quoted from participants' writings below unveiled challenges, indicative of a potential disorienting dilemma. (Underline indicating a disorienting dilemma and bold font suggesting increased cultural empathy were added by the author).

1) *When I read about the time management readings, I felt troubled to accept the second type of time management (= Latin time) (John)*

2) *Such emotion (= frustration) taught me that sometimes I could not simply accept everything as it is. (Tim)*

For RQ2 where the focus was on whether transformation occurs through the reading activity, the data indicates that a profound transformation didn't unfold during the semester; however, notable shifts in perspective and mindset, indicative of increased cultural empathy, did transpire. Ethan expressed intentions to alter his behavior when interacting with Japanese individuals, signifying changes in his approach.

3) *My parents love to send food (chopstick to chopstick) to me to show their love. However, it seems disrespectful in Japanese culture. Also, we cannot stick the chopstick.* **Probably I will talk to my parents about this little story, and if I have a Japanese friends, I will pay more attention to it.** *(Ethan)*

The quotes below show that participants with a more relaxed approach to time, often associated with "Latin time," undertook a reconsideration of their behavior. Encouragingly, some expressed a commitment to understanding perspectives divergent from their own. This shift in mindset signifies a notable increase in cultural empathy following the reading activity.

4) *I am a extreme casual person and did believe that being late shouldn't be a big issue. But after reading the comments by my fellow classmate,* **I realized that showing up on time and keeping updates with schedules should be a more respectful thing**. *(Aline)*

5) *The last story I read is awe-inspiring to me. This also**, to some extent, changed my attitude toward time issues**. I previously have not realized that being late is a way of not showing respect to others. (Rin)*

6) ***This changed my behavior** as, after reading these stories, **I start to put more attention on my friends' feeling** and trying hard not to be late when I have appointments with my friends. (Edward)*

Meanwhile, on the same topic, a fascinating observation emerged. Students who prioritize punctuality demonstrated an awareness of the opposing viewpoint but retained a negative emotional response toward those with a more relaxed attitude towards time. It appears that while they acknowledged the difference, truly empathizing with the "Latin-time" perspective seems challenging for them. This insight implies that accepting diverse viewpoints on certain concepts may present greater difficulty compared to others.

Furthermore, some participants mentioned that they had been already exposed by different cultures since childhood, therefore, this activity offered them an opportunity to reflect on their own values and perspectives but did not give them disorienting dilemma and/or a new insights into cultural value conflicts. Thus,

Lastly, concerning RQ3 which questioned the effectiveness of this activity towards the issues at elementary level FL classroom discussed in the literature review, many students offered positive feedback as seen in table 4 below, citing the engaging nature and authentic content. Furthermore, they found the grammar and vocabulary challenges to be at a suitable level, enhancing language proficiency, particularly in reading skills. This underscores the activity's dual capacity to address both linguistic and cultural elements, even within the constraints of limited proficiency.

Category	Code	Count
Cultural content	Engaging way to learn culture in context than textbook	6
	Opportunity to learn Japanese and classmates' cultures	4
	Real examples – easy to relate and be emotional	5
Language content	Decent level of challenge (grammar and vocabulary)	7
	Contribution to improving reading speed	2

Table 4: Feedback on the learning activity

Conclusion

The exploration into the integration of critical incident scenarios in an elementary-level Japanese language course has yielded significant insights, enriching the discourse on transformative language learning and teaching (TLLT) and the cultivation of cultural empathy in foreign language (FL) education. This research aimed to assess the impact of a reading activity centered around critical incidents on students' cultural empathy, specifically addressing the challenges inherent in culture learning within introductory-level language courses.

Results indicate that the reading activity exerted a positive influence on students' comprehension of Japanese culture and their classmates' diverse cultural backgrounds. The

engagement with critical incident scenarios prompted a profound reflection on personal values and the intrinsic importance of empathizing with others. Noteworthy challenges, such as grappling with the concept of punctuality, hinted at the initiation of disorienting dilemmas—a pivotal element in transformative learning (Mezirow, 1978). Although a profound transformation did not transpire during the semester, notable instances of increased cultural empathy emerged. Students demonstrated a willingness to reconsider their behaviors and adopt a more culturally sensitive approach. The identification of disorienting dilemmas in some responses suggests that the reading activity triggered cognitive conflicts, prompting students to question their preconceived notions and consider alternative cultural perspectives.

Furthermore, the emotional responses expressed by students in their semester-end reflections underscored the enduring impact of the narratives. Feelings of empathy, sadness, anger, and surprise in response to specific critical incidents suggested a genuine connection with the characters and scenarios presented. This aligns with the notion that personal narratives, when adeptly employed, can evoke robust emotional responses, rendering the learning experience more relatable and memorable. However, it is crucial to emphasize the commitment to maintaining a safe and supportive environment for all participants involved. Given the sensitive nature of the research—exploring personal reflections, cultural perspectives, and potentially transformative experiences—FL educators must be steadfast in upholding ethical standards and ensuring the well-being of every participant.

The study also addressed challenges related to integrating cultural content in introductory-level FL classrooms. Positive feedback from students regarding the activity's engaging nature, its relevance to real-life examples, and its contribution to language skills improvement indicates that short reading activities featuring authentic cultural content can effectively navigate obstacles posed by limited language proficiency, time constraints, and curriculum limitations.

While this research provides valuable insights, acknowledging its limitations is essential. The study's timeframe was confined to one semester, relying primarily on semester-end reflective writings. This short-term perspective may not fully capture the long-term effects of the reading activity on students' cultural empathy and transformative learning. Disparities in language skills may have influenced the depth of engagement with critical incident scenarios and subsequent reflections. Additionally, focusing on Japanese language learners in a specific university setting might limit the transferability of outcomes to other language courses or institutions with distinct curricula, student demographics, and language learning contexts.

To comprehensively understand the impact of reading activities on cultural empathy, future research should explore the long-term effects beyond a single semester. This would offer valuable insights into the sustained influence on students' perspectives over an extended period. Delving into alternative topics that are more likely to trigger disorienting dilemmas could push the boundaries of cognitive conflicts, potentially leading to more profound transformative experiences. Exploring the integration of multimodal approaches, such as visuals or interactive elements alongside critical incident scenarios, could be pursued to assess their impact on cultural empathy.

In conclusion, the utilization of critical incident scenarios in an elementary-level Japanese language course proved to be a valuable approach for fostering cultural empathy and addressing the dual challenges of cultural and language learning. The study contributes to the existing literature on TLLT by providing practical insights into the implementation of

transformative pedagogy in introductory FL courses. As language educators navigate the evolving landscape of FL education in the 21st century, incorporating innovative and meaningful activities that promote cultural empathy remains a crucial aspect of preparing students for global citizenship.

Acknowledgements

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Exploring Face-to-Face vs. Online Feedback Approaches in Academic Writing Courses

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Abstract

There are various ways in which teachers and students provide feedback in L2 academic writing courses. This has been especially true over the past four years during and after the pandemic. This research presents two dimensions—how the teacher has changed his approach to giving feedback during and post-COVID interruptions, and key differences noted in students' comments in online and face to face contexts. This paper first gives a description of his changing approach in giving feedback in online and face to face contexts. Secondly, the researcher will present data findings showing the differences in quantity and quality of student feedback between October 2021—March 2022 (online) and April 2023—August 2023 (face-to-face). Data from feedback collected show that students' face-to-face comments have more length and depth, especially in being critical about content and logic, as opposed to the virtual environment where students gave mostly surface comments on grammar, spelling, and writing structure. The researcher will further provide results showing a comparison of quantity related to specific grading criteria as well as linguistic tone when communicating online and face to face. Key findings highlight the important role dialogue plays in academic writing when providing feedback in either online or face-to-face settings.

Keywords: Academic Writing, Feedback, Online vs. Face-to-Face Teaching

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Introduction

Having strong written communication skills is essential in academia as well as beyond the classroom. How to write well academically at the tertiary level requires a substantial amount of reading (Linuwih, 2021), an understanding of formality and accuracy of academic vocabulary (Syarofi & Shobaha, 2023), and consistent practice of controlled writing covering a range of writing genres (Mallia, 2017). However, without receiving feedback or reflecting critically on one's writing, it is difficult for learners to identify areas to improve or gauge overall progress. Feedback approaches in academic writing courses vary depending on educational settings, cultures, institutional goals and expectations, proficiency levels, among others. Between 2020-2023 during the COVID-19 pandemic, approaches to feedback faced new challenges as many teachers and students were suddenly thrown into emergency remote learning environments. For teachers who had already been conducting academic writing in an online setting, feedback approaches may not have changed; however, for a substantial number of teachers, including those at the institution at which this research took place, new protocols had to be implemented to ensure the quality and quantity of feedback remained at a high level. During these three years, many fruitful discussions between teachers occurred which led to unplanned, but very welcome informal professional development sessions. One key realization that emerged among the teaching staff was that we all had to revisit teaching practices learned in our early teaching days and rethink best approaches for the new era. We had further acknowledged that many of us had comfortably settled into one pattern of teaching or were not fully up to date with useful technological tools and applications to assist students in becoming more critical writers.

This research presents two dimensions. First, it follows changes in feedback approach by the researcher before, during, and after COVID-19. Secondly, data findings will be presented showing the differences in the quantity and quality of student feedback comparing online and face-to-face contexts between October 2020—February 2023 (online, Semester 2) and April 2023—August 2023 (face-to-face, Semester 1). The research concludes by offering insights into benefits and drawbacks of face-to-face versus online feedback approaches in academic writing courses.

Research Context

This research took place in an academic writing course for freshman students at a national university in Japan. Research participants majored in various fields (Engineering, Letters, Agriculture, Science, and Economics) (Figure 2), but all students had to take English writing courses to gain the required number of credits for graduation.
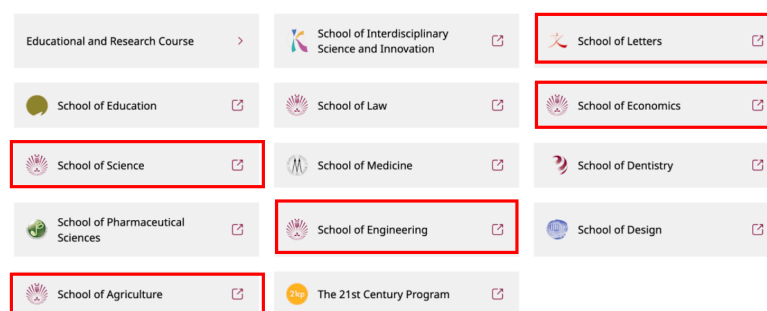

Figure 1: Student participants by faculty https://www.kyushu-u.ac.jp/en/faculty/

Proficiency levels ranged from B1 to B2 (English independent user) on the CEFR (CEFR, 2001) scale. The researcher taught five writing classes with an average of 20 students in each class. At the start of the semester, there were approximately 100 students. Due to the attrition rate over the 16-week semester in both online and face-to-face contexts, the final data set collected from feedback comments on Moodle (Moodle, 2024) and Google Docs (Google Doc, 2024) consisted of 90 students (90%) in the online course (semester 1) and 85 (85%) in the face-to-face setting (semester 2) respectively. The main reason for the higher attrition rate in the physical classroom was that many students find it difficult to maintain attendance throughout the semester and fail due to the policy of no more than 30% absences. In the online context, students were typically able to work at their own pace and at the most suitable time as the teacher did not organize virtual meetings on Zoom every week. The researcher was thus able to collect a significant amount of data from both contexts. Between 2022-2023, the researcher tried various feedback approaches which provide insights into the most effective method of providing feedback that would enhance student learning.

Teaching Journey: Changing Approach to Giving Feedback

This section describes the researcher's changing approach to giving feedback in the academic writing course. Through close observation of and reflection on the various approaches, it was possible to identify benefits and drawbacks of each method and understand which method was more effective in face-to-face and online contexts.

Pre-2018 (Face-to-Face)

The university's academic writing syllabus focuses largely on a process-style approach to writing essays with intermittent feedback, rather than the teacher grading only the final product. The approach described in Figure 2 was the style all teachers had been using at the time. Typically, the researcher would ask students to print out the first draft of their essay and then the teacher would give feedback. This was repeated a few weeks later with the students highlighting the revisions they made. The teacher checked the revised, highlighted sections and then the students wrote and submitted the final draft a week later, attaching all the previous drafts.

Face-to-Face (Classroom)
Students print out their essay on paper and submit to teacher (Draft 1)
The teacher gives feedback
Students submit their essay again (Draft 2 with revisions highlighted)
The teacher gives feedback
Students submit the final draft and teacher collects all drafts (Draft 1, 2, & 3)
The teacher grades the final draft

Figure 2: Feedback approach pre-2018

The benefit of this method was that the teacher could observe student progress after subsequent drafts, and help the student understand areas to improve. The drawback was that unfortunately, some students submitted the same essay three times without making or highlighting any revisions. This was demotivating for the teacher who had spent 3-4 hours grading each class. Thus, this style of feedback favored students who were intrinsically motivated and driven to improve their academic writing.

2018–2020 (Face-to-Face)

Class sizes had been increasing from 2015 and thus the previous method of giving feedback became unsustainable as it was leading to teacher burnout. Thus, an alternative approach was needed to maintain quality and quantity of feedback while lessening the workload (Figure 3). Discussions with a colleague (McCarthy & Armstrong, 2019) led to a new student-centered approach with the aim of increasing critical thinking and dialogue.

Face-to-Face (Classroom)
Students print out their essays on paper
Students give feedback on each other's essays using checklist from the teacher
The teacher responds to questions during class
Students revise and submit to teacher one week later (Draft 1)
Teacher gives feedback
Students submit their essay after revisions (Draft 1 with revisions highlighted & Draft 2)
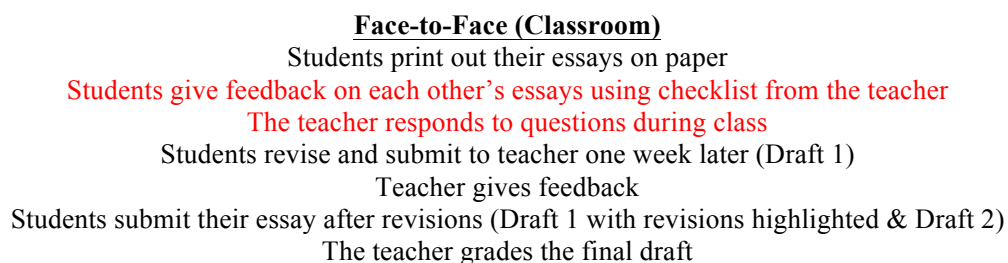The teacher grades the final draft

Figure 3: Feedback approach 2018-2020

In this approach, the researcher continued to provide feedback, but decided to give more responsibility to the students. The aim was to help students critically self-evaluate their own writing, thereby increasing self-awareness of their writing ability, as well as specific academic writing components. A checklist was given to students covering the four grading criteria: format, language, structure, and content. The researcher added more time for discussion among students and group questions with the teacher for any areas that were unclear. The benefit of this method was that students became more active in the learning process. Instead of seeing the teacher as "expert," students were now encouraged to think more deeply and critically of the writing process themselves. The disadvantage was that many students felt anxious about sharing and discussing their essay with others, especially those who had a lower proficiency of English. The researcher allowed students the option to have discussions in their L1 to reduce any concerns.

2020–2022 (Online/Hybrid)

At the start of the pandemic all classes in 2020 moved online for a year. The feedback style which the researcher had been using successfully had to be changed immediately as group discussions were more difficult to incorporate into online and hybrid classes (Figure 4). Again, through discussions with colleagues, a new feedback approach was developed to meet the expected standards at the university. Classes in 2020 were held as mostly on-demand lessons meaning that the researcher prepared videos and students had the freedom to learn at their own pace. Feedback was given only once by the teacher on paragraphs uploaded step-by-step as students wrote their essay. Zoom (Zoom, 2024) was used periodically to meet with students and explain points that students needed to improve generally as a class. By 2021, the researcher became aware that the most successful component of the feedback classes was student discussions and question time with the teacher. As such, more Zoom classes were added and Moodle was used to encourage written feedback. By this time, students were more familiar with how to use online tools such as Zoom and were able to share screens to discuss essays. The most significant changes made during this time was that students used the checklist before feedback classes to check their own essays and the researcher also asked students to pre-label the structural parts of their essay. In this way, the students were able to prepare in advance.

Online (On-demand and Zoom)
Self-check of essay structure, content, language, and format using the teacher's self-directed checklist
Students prepare to share their essay
Students label the parts of their essay by themselves
Students organized into breakout rooms (in pairs)
Students read and discuss each other's essay
Student asks teacher for advice if they have questions
Student submits final essay after revisions

Hybrid (Classroom/Moodle)
Students label the parts of their essay by themselves
Students upload essay to Moodle
Students organized in groups in Moodle and in the classroom
Students read and discuss each other's essay
Student asks teacher for advice if they have questions

Figure 4: Feedback approach 2020-2022

The benefit of the online approach was that students could learn at their own pace and at a time that was suitable to them. By adding specific self-checks, students could feel more prepared to give feedback as well as understand which areas were lacking in their essay writing. The disadvantage was that many students were unfamiliar with the various platforms and felt it was too much work to upload essays, share screens, meet in breakout rooms, and write comments on Moodle. Each platform required a different password, and the university had also began to put restrictions on certain settings to protect student identities.

2023–2024 (Face-to-Face)

When classes resumed face-to-face after the pandemic, the researcher reflected on the successes and drawbacks of previous methods. Once again, through dialogue with a colleague at another national university, the current feedback approach (Figure 5) was developed and implemented.

Face-to-Face (Classroom/Google Doc.)
Weeks 1-7: Teacher modeling of feedback
Weeks 8-16: Critical analysis of paragraphs and practice feedback sessions every 2-3 weeks
Self-check of essay structure, content, language, and format using the teacher's self-directed checklist
Students arranged in Google Doc groups and upload their essays (Draft 1)
Students individually label the parts of their own essay
Students write comments on Google Doc in English/bilingual as practiced in previous classes
The teacher checks the comments and provides feedback on comments (meta-feedback)
Students revise their essay
Teacher offers in-office consultation for students who have questions OR
invites students to ask specific questions on their writing via the Google doc
Students submit final essay after discussions and revisions

Figure 5: Feedback approach 2023-2024

The most notable change in this feedback approach was the addition of the critical analysis of body paragraphs which was done three times in the latter half of the 16-week semester. The researcher found that through critical analysis of writing, the students could better understand the grading process and give more effective feedback, whether in online or face-to-face contexts. The critical analysis was less effective in the first part of the semester as students did not yet have a complete understanding of essay components and grading criteria. As such, the teacher focused on modeling feedback in the first part of the semester and then followed up with paragraph analysis. In addition, along with talking with students in groups, the teacher offered consultation hours for students who needed more assistance. Google Docs became the platform to give written feedback as most students had a gmail account and could access and use it easily. This approach has been the most effective since returning to the classroom after the pandemic and has resulted in improved feedback comments and a higher standard of essay writing.

The next section of this paper presents data findings which illustrate differences in quantity and quality of student feedback between October 2021—March 2022 (online) and April 2023—August 2023 (face-to-face).

Learning Journey: Students' Ability to Give Critical Feedback

Data was collected from approximately 90 students in the online setting and 85 students in the face-to-face classroom. The data examines firstly the quantity of comments and then the quality.

Quantity

Feedback data collected from written comments on Moodle during online learning numbered 128 and comments after the pandemic when face-to-face classes resumed numbered 176. Even though there were more comments in the face-to-face setting by fewer students, the quantity of comments was satisfactory for both contexts. Data showed that sufficient comments were written across all faculties. Where they differed was mostly in length of comments as the more proficient students wrote in more detail. One point to note here is that instead of writing several small, specific comments throughout the reading of the essay, students were encouraged to write one or two longer, more general comments about areas they felt were strengths and areas in which they felt the essay could be improved. If they wanted to, they could then pinpoint specific examples from the essay. This ensured that the slower-proficiency students did not feel overwhelmed with the task and more advanced students could have more freedom in the way they approached the task.
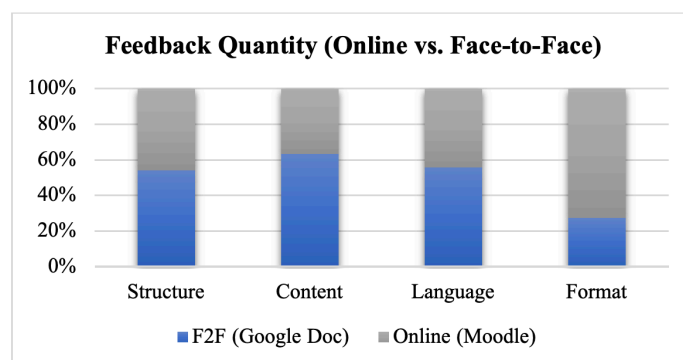
Figure 6: Comparison of feedback quantity (online and face-to-face contexts)

The key findings illustrated in Figure 6 are in the percentage of comments observed when comparing online and face-to-face comments in the four grading categories. In the online setting, most of the comments written were about formatting (74%). Comments about language accuracy (42%), content (39%), and structure (43%) were somewhat similar in number. The researcher noted that students typically found it easier to provide feedback on format and structure since these areas are more objective and straightforward to check. Regarding accuracy in language, most of the comments were on spelling and grammar as students picked up many of the suggestions by the software editing checks. There were fewer comments on academic word choice as this was the most difficult part of language checks. In comparison, during face-to-face feedback, students rarely focused on formatting, but instead discussed the content of the essay. This shows that dialogue during feedback lessons enhances the writing process as students speak more deeply about the content as opposed to just reading and writing comments. In particular, students talked about reasoning and logic in

writing. Helping students to understand how to write strong content in an academic essay is an area that is difficult to teach to an entire class as each topic is decided by the students themselves. That is, students must research and decide which information they will include in the essay themselves and consider if the selected information has unity and coherence, as well as a logical flow.

Quality

Regarding quality of feedback, the research sought empirical evidence showing differences in in online and face-to-face environments. However, interestingly, the quality in both learning environments, for the most part, was similar. The major difference observed was that lower proficiency learners wrote more surface comments (e.g., on format and grammar) as well as shorter sentences in a somewhat monologic style. However, they seemed to benefit more from the feedback received as they were able to revise their essay to a higher standard from the original Higher proficiency learners wrote more critical comments on key structural errors and weaknesses in content in a dialogic style and with a higher level of linguistic complexity. This finding is in line with Gao et al. (2023). What the researcher noted most significantly when analyzing the data is that the quality of feedback increased when meaningful dialogue during paragraph analysis were incorporated into feedback classes (see Schillings et al., 2018 for similar findings). Figure 7 shows the quality of feedback written when students were asked to quietly read their partner's essay and write comments (left side) and feedback written by students after paragraph analysis tasks and discussion were introduced into feedback classes (right side).
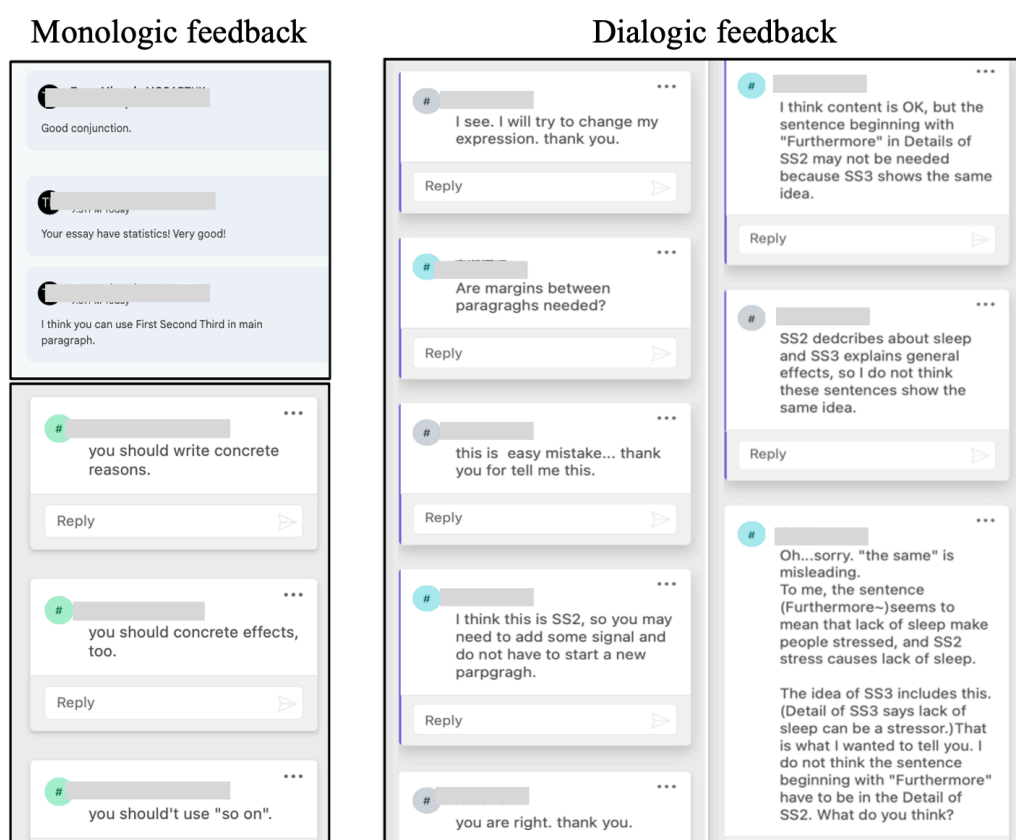
Figure 7: Quality of feedback

As can be seen in the figure, in the monologic style, the student reviewer wrote shorter comments that although insightful to the writer, did not provide much detail. There was no acknowledgment to the reviewer to show that the writer had read the comments. This was an issue to some students who felt like they had taken on the role of "teacher," and they did not feel that this was their responsibility. Linguistically, the tone is somewhat harsh with the expression "you should" appearing frequently in the comments.

> *you should write concrete reasons*
> *you should concrete effects*
> *you shouldn't use "so on"*

This style of feedback was observed in both online and face-to-face settings. On the right side, the feedback is more conversational as it includes words of thanks from the writer.

> *this is easy mistake…thank you for tell me this*
> *you are right. thank you.*

There are even moments of disagreement where students defend their writing positions which shows that through dialogic feedback, students are able to understand and explain writing conventions more deeply.

> *A: I think content is OK, but the sentence beginning with "Furthermore" in Details of SS2 may not be needed because SS3 shows the same idea.*
> *B: SS2 describes about sleep and SS3 explains general effects, so I do not think these sentences show the same idea.*

Because students were asked to label their essays in advance using coding symbols (SS2: Supporting sentence 2), they were able to easily incorporate this academic writing terminology into their feedback. A second observation was students adding "What do you think?" to the end of the comments. This is a technique the researcher often used when modeling feedback in the first part of the semester to help students develop a more critical mind when self-evaluating their writing. It was interesting to observe students using the modeling style in their own feedback. Based on the data findings, it can be concluded that modeling is a useful technique for teachers who are trying to incorporate more peer feedback into academic writing classes.

For students who need more detailed feedback, a second useful suggestion would be to ask students what kind of feedback they prefer and offer consultation hours to address specific concerns. In a previous study conducted by the researcher (Armstrong, 2023), students were asked about their preferences for receiving feedback. Figure 8 shows the results.
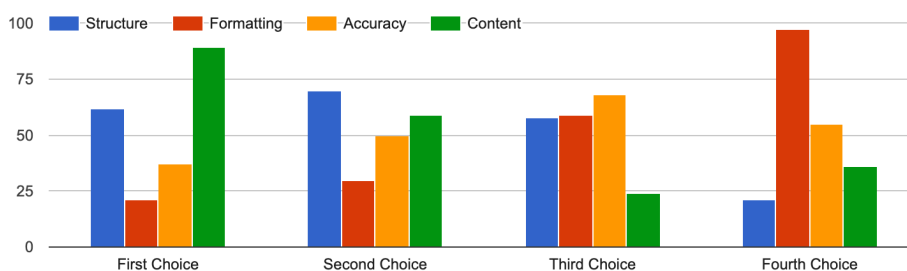
Figure 8: In order of importance, how would you prefer to receive feedback?

From the researcher's experience, only students who are either highly motivated or failing the course ask for extra assistance, thus this does not add to the teacher's workload. However, having students reflect on aspects of their writing they need specific help with before consultation helps to speed up the process and improve the quality of feedback.

Conclusions

This study first provided a description of the researcher's journey over a decade of giving feedback in an academic writing course culminating in his current dialogic approach. It then compared the quantity and quality of feedback in online and face-to-face learning contexts. The most significant findings observed from the collected data were that incorporating analytical tasks, feedback modeling, and discussion were the most beneficial in improving both the quantity and quality of peer feedback. Regarding quantity, the number of comments in classroom settings were slightly higher than in online settings mainly because students were able to discuss the essay while writing comments. The researcher found that the quality of feedback was similar regardless of learning environment. However, what was most interesting was that after doing several paragraph analysis discussion tasks before the main feedback class, students became more dialogic in their peer feedback style. They acknowledged each other's comments, used more linguistically complex sentences, and their language became more formal in tone. What the researcher gained mostly from this study which other teachers could benefit from is that successful peer feedback in academic writing courses requires three main elements: meaningful dialogue (critical discussion about academic writing components), self-directedness (a willingness to take more responsibility for the quality of one's own writing), and inquiry (reflecting on strengths and areas to improve and asking the necessary questions to improve one's writing). However, it is also important to be mindful not to fall into formulaic teaching, but rather be aware that each writing course, each group of students, and each teaching context often requires a tailored approach.

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The Integration of Error Correction Codes in Five Introductory Writing Classes

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Abstract

Effective teacher feedback on second language writing cannot begin and end with surface error correction. However, many students equate 'good' writing with error free writing and see any attempt on their part to fix their errors as a way, and at times the only way, to improve their writing. Hence, instructors and students often hold contrasting opinions about improvement in the context of the second language writing classroom. This educator's reflection focuses on students' use of error correction feedback across five sections of an introductory writing class taught in Spring 2023. There is a brief discussion surrounding error correction, but the primary focus is on students' performance in three assessments in which error correction codes were a component. The findings show that there was a retention and application of some concepts, evidenced on the writing portion of the final exam. However, when judged independently, students struggle to identify and fix errors using codes. Error correction can therefore only be truly assessed and deemed effective when looked at in conjunction with other modes of corrective feedback as students engage in the writing process.

Keywords: Writing, Error Correction, Feedback, Assessment

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Introduction

One of the primary goals of any L2 writing instructor is to help students produce comprehensible texts, and one of the ways they do this is by providing corrective feedback. As numerous studies (Boggs, 2019; Hadiyanto, 2019; Polio, Fleck, & Leder, 1998) have shown, learners do benefit from this kind of feedback as it can help improve their writing skills. Feedback can take the form of detailed narrative comments, individual conferences, peer review, or error codes. The latter involves not only identifying where the error has occurred and the type of error, but also examples of how to fix each error. This is seen as a viable option since it is less time-consuming in comparison to more detailed written feedback. Error codes are also useful as they allow students to work on fixing their errors independently. This is in contrast to direct or explicit feedback where students provide the correct linguistic form or structure.

According to Hyland (1990), one of the principal benefits of error correction codes is that they help to reduce the visible indicators of errors on students' writing; think of the dreaded red ink pen. Instead, instructors merely point out the location and type of error. In tandem with this is Lee's (1997) observation that inaccuracies in students' writing often occur because they fail to detect errors. However, when provided with symbols and/or abbreviations indicating such errors, students' can make corrections and reduce inaccuracies. In addition, the use of codes can help to reinforce principles that may have been previously taught as students can now see their application to their writing.

Unsurprisingly, there are some noted limitations of using error correction codes. In his 2011 study, Corpuz noted that students did not know how to use the codes to correct their sentences. Other participants stated that the process was time consuming, especially if they had to look at multiple codes and then correct their sentences. One additional issue that I have encountered in my practice is that students are often unable to retain or apply the use of the error correction codes outside the context of a specific writing assessment. So while learners may make corrections on a revised draft, the same mistakes often reappear in subsequent written assessments, with students having forgot the codes, their meanings and/or applications in the process of improving their writing.

Methodology

In Spring 2023, the writer taught five sections of ENG 210, an introductory writing course taken by undergraduate students at the academy. The class met once a week for 2.5 hours, over the course of fifteen weeks. Average class sizes ranged from 13 to 30; during the Spring 2023 semester, a total of 103 students were enrolled across the five sections.

On the first day of class, the instructor spent some time discussing the four learning outcomes (LO) stated on the syllabus:

    LO1   Produce a variety of texts written with appropriate organization and content.
    LO2   Apply phases of the writing process in the creation of written texts.
    LO3   Present a coherent oral argument justifying written texts.
    LO4   Use sources appropriately with correct APA citation.

Students received a physical copy of the error correction codes during this initial session, with a digital copy also available on Moodle.

symbol	meaning	incorrect sentence	explanation	correct sentence
SV	subject-verb agreement	The student work hard. There is five employees.	Subjects and verbs must agree in number.	The student works hard. or The students work hard. There are five employees.
pl	singular/plural	The internet has a lot of informations. You can make new friend easily.	Certain nouns are uncountable. Other nouns need an indication of how many.	The internet has a lot of information. You can make a new friend easily. or You can make new friends easily.
sp	spelling	The maneger is a woman.	Manager is spelled incorrectly.	The manager is a woman.
A	article (a, an, the)	Diners expect glass of water when they first sit down at their table.	Glass should be preceded by the article a.	Diners expect a glass of water when they first sit down at their table.
^	add word(s)	A camel is an animal lives in the desert.	A word is needed between animal and lives.	A camel is an animal that lives in the desert.
cap ≡	capitalization	Some people love to drive land cruisers.	Land Cruisers is a proper noun and needs a capital letter.	Some people love to drive Land Cruisers.
/	lower case	Earth is my home Planet.	Planet does not need a capital.	Earth is my home planet.
VF	verb form	I am live in the hotel.	Am live is the wrong verb form	I live in the hotel. or I am living in the hotel.

Table 1: First page of error correction codes sheet used by students in Spring 2023 – ENG 210

symbol	meaning	incorrect sentence	explanation	correct sentence
VT	verb tense	I see my friend yesterday.	Yesterday indicates the past tense.	I saw my friend yesterday.
WF	word form	This book is bored.	Bored is an active adjective.	This book is boring.
WW/WC	wrong word or word choice	My professor learns me many new things.	Learns is a receiving verb.	My professor teaches me many new things.
RO	run-on sentence	Abdulla failed the exam and he is upset he went home and his father said he shouldn't worry.	Independent clauses need to be separated by commas and conjunctions or full stops.	Abdulla failed the exam, and he is upset. He went home and his father said he shouldn't worry.
CS	comma splice	Mohammed is tired, he went to sleep.	Complete thoughts should be separated into sentences or combined into a compound sentence.	Mohammed is tired. He went to sleep. or Mohammed is tired, so he went to sleep.
frag.	sentence fragment incomplete sentence	He was tired. Because he always went to bed at 3:00am.	Because cannot start a sentence without a dependent clause after it.	He was tired because he always went to bed at 3:00am. or Because he always went to bed at 3:00am, he was tired.
WO	word order	You haven't seen yet London.	Yet should come after London.	You haven't seen London yet.
???	confusing	I don't understand what you are trying to say.		

Table 2: Second page of error correction codes sheet used by students in Spring 2023 – ENG 210

I explained the meaning of each symbol/code, and students read the incorrect sentences, explanations and corrected sentences with additional clarification provided as needed. I advised them to bring the sheet with them each week, highlighting its importance. During the semester, LO2 and by extension the application of the error correction codes was assessed three times: Assessment 1, Assessment 2 and the Final Exam.

Results

Students' performance on LO2 varied greatly by assessment. Of the five sections of ENG 210, only two sections scored 70 and above on LO2 attainment for Assessment 1. Only one section scored 70 and above on LO2 attainment for Assessment 2, while none of the sections scored 70 and above on LO2 attainment for the final exam.

	Assessment 1	Assessment 2	Final Exam	Spring 2023 Average
Section A (n=23)	60.87	26.09	13.04	53.7
Section B (n=17)	94.12	82.35	41.18	69.6
Section C (n=23)	65.22	34.78	8.70	56.7
Section D (n=17)	82.35	58.82	23.53	64.7
Section E (n=23)	65.22	8.70	8.70	50.1

Table 3: LO2 attainment – 70% and above

All five classes performed best on Assessment 1. Students submitted two typed paragraphs after receiving feedback on in class, handwritten paragraphs. Each paragraph was a minimum of 150-175 words, so this was not a lengthy assessment. I released the assessment in Week 3 as per institutional policy, and students submitted their final drafts in Week 5, giving them two weeks to complete the assessment. Sections B and D scored well on LO2 attainment, greatly surpassing the 70% target. And although the other sections scored below 70%, it is still noteworthy that each class attained a score in the 60s.

On the other hand, only one class earned over 70% on LO2 attainment for Assessment 2, the opinion essay. Using one provided research article and an article of their own, students submitted a four-paragraph essay of a minimum of 600 words. However, this time they only received feedback on one body paragraph as well as feedback on their introduction OR conclusion. As with the first assessment, first drafts were written in class and final drafts were typed and submitted two weeks after the release date. Section B scored very well on LO2 attainment with 82.35% while on the other end of the spectrum, Section E failed to attain even 10%. As for the other three sections, two scored below 40% and Section D came close to 60%, but still fell short of the 70% target.

The final assessment of the semester was the final exam held in Week 16. Here, we see a marked difference across all sections, except Section E which scored the same for LO2 attainment on both Assessment 2 and the final exam. For the other four sections however, the performance on the final exam showed a steep decline in LO2 attainment scores; this was especially evident for Sections B, C and D. The final exam consisted of three sections; students wrote two opinion paragraphs in Section 1, completed two error correction exercises in Section 2 and responded to a question related to APA citation in Section 3.

Discussion

Based on the results in Table 3, students struggled most with LO2 attainment on the final exam. I believe that one of the primary reasons for this was the fact that the errors were not named but instead students merely had to correct the circled mistakes.

The (hole) department meets every Thursday afternoon for two hours. (There is) twelve people in our department. All the people in our (department hard) workers. Everyone comes in early and leaves (late we) are all overworked. Nobody ever (complain) about the amount of work there (is do,) but nobody works hard enough to please (Sally our) boss. (Anybody) has ever seen her smile. Nobody has ever heard her say anything (complimentry) to anyone. When Constance enters the (room everybody) stops talking.

Figure 1: Question 4 on the Spring 2023 ENG 210 Final Exam

As seen in Figure 1 – one of the two questions of this nature on the exam – there are no abbreviations or symbols provided as on the error correction sheet. However, I am not sure if providing them with the symbols would have yielded different results. Unless the meaning of each error is known as well as the correct form, a student may have still scored poorly in this section of the exam.

A stronger argument can be made for the fact that on the final exam, LO2 attainment was only judged based on error correction. However, for both Assessment 1 and 2 completed during the semester, criteria such as improvement and similarity between drafts were also factored into LO2 attainment since this was a learning outcome related to the writing process. Since this was a timed exam, these criteria were not applicable, so students had no time to revise their work. And again, LO2 attainment on the final exam was only about error correction whereas during the semester, LO2 attainment focused on the writing process of which error correction was a single component.

The weighting of the error correction questions on the final exam also contributed to the lower scores. 40/100 points were attributed to this section of the exam; each corrected error was worth two points. If a student failed to score well in this part of the exam, it undoubtedly affected the final overall grade. It must be noted that this has since been amended, and the Fall 2023 final exam, which was recently administered, asked students to complete one error correction paragraph instead of two.

As for Assessment 2, a few factors contributed to the lower scores in LO2 attainment when compared to Assessment 1. Firstly, most students only made minor corrections on their final draft, even after they received both implicit and explicit feedback. Secondly, they did not seek extra help by visiting the Academic Support Center which was factored into their LO2 score for the opinion essay. And finally, many students scored lower in similarity in comparison to Assessment 1. In an attempt to earn the best grade, these students submitted final drafts that were completely different from their in class handwritten work, either in style, content or both. So while error correction was a crucial component of the writing process, it was not as previously stated, the only factor. Students who failed to engage in the overall writing process also failed to do well with LO2 attainment.

Conclusion

One of the principal findings of this reflective undertaking was that error correction is only a small part of process writing. More than one method to provide students with feedback must

always be considered in relation to second language writing. Students' failure to correct errors on the final exam was not indicative of a failure to self-edit or to incorporate what they had learned about the codes. This conclusion is supported by students' performance on LO1 – the learning outcome directly related to writing (grammar and mechanics, content, organization etc.) and specifically on the final exam.

	Final Exam LO1 attainment	Final exam LO2 attainment	Spring 2023 Average LO2	Spring 2023 Average LO1
Section A (n=23)	60.87	13.04	53.7	78.9
Section B (n=17)	70.59	41.18	69.6	79.2
Section C (n=23)	56.52	8.70	56.7	74.9
Section D (n=17)	58.82	23.53	64.7	79.8
Section E (n=23)	47.83	8.70	50.1	72.6

Table 4: – LO1 and LO2 attainment – 70 % and above

As seen in Table 4, all sections performed better on LO1 attainment in the final exam compared to LO2. Even more importantly, all sections earned above 70% on LO1 rewritten here:

LO1 Produce a variety of texts written with appropriate organization and content.

Therefore, while perhaps unable to distinguish between a comma splice and a fragment and while perhaps including both of these errors in their writing, students still produced comprehensible texts on the final exam, with no time for revising or editing. Given the tendency of some second language writers to memorize sentences or paragraphs before exams (Kabouha & Elyas, 2015), students produced texts that were for the most part coherent and cohesive. And in the final analysis, error correction codes were but one small cog in the writing wheel.

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Comparing Students' Learning Preferences Through Cluster Analysis: Implications for Higher Education

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Abstract

In response to the disruptive changes within society and technology, higher education institutions need to transform their content-centric curricula into learning pathways that effectively equip students for the workforce. Adapting to the challenges posed by evolving learner dynamics is a crucial approach for institutions to enhance their responsiveness to such changes. This research aims to investigate the categorization of potential students based on their learning preferences, study self-efficacy, and learning motivation. Furthermore, the study seeks to compare the attributes of students across these different clusters. The participants were secondary high school students from various school types in Thailand, using a multi-stage random sampling method for an online survey. Analyzing responses from 1137 students, a two-step cluster analysis identified three distinct clusters. The comparison of student characteristics among clusters showed significant differences according to the student's study self-efficacy, motivation, and learning preferences. Students in a cluster where the majority perceived their academic accomplishments to be at or above an average level exhibited significantly stronger preferences for non-traditional and traditional study approaches than the other clusters. The study also discussed how students' learning preferences and interests in academic disciplines are associated with their psychological attributes and perceived academic achievements. The distribution of cluster memberships holds significance for institutions, particularly in communicating innovative learning approaches to potential students.

Keywords: Learning Preferences, Motivation, Study-Self Efficacy, Cluster Analysis

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Introduction

Amidst a social context that is highly volatile, uncertain, complex, and ambiguous, teaching curricula at various levels have turned the focus on creating "competencies and "learning outcomes" in replacing teaching formats and goals that focused on subject content. Higher education institutions (HEIs) have recently established new ways of acquiring skills to fill a gap between traditional higher education qualifications such as bachelor's, master's, or doctoral degrees and the skills that firms seek. Trends in self-paced, competency-based learning through terms such as Micro-credentials, Digital Credentials, and Alternative Credentials have been increasingly offered among HEIs. Although definitions and taxonomies to structure these targeted learning have yet to be widely agreed upon, they have changed the higher education delivery model (OECD, 2020).

Previous research indicated that students enroll in university with preconceived beliefs and expectations to acquire knowledge, develop competencies, and earn a degree according to formal education (Koul et al., 2012). As learners are in a dynamic context and do not belong to static characteristics, this study was conducted as a Scholarship of Teaching and Learning to explore patterns and groups of young learners' characteristics and preferences to further their learning journey at higher education. The focus was on the formal undergraduate level, where "traditional programs" increasingly shared the higher education market with emerging alternative approaches, which this paper termed "non-traditional programs."

In this paper, the term "traditional programs" involves learners enrolling in a university program that requires a time commitment of years, leading to the completion of a degree. This approach often includes a structured and fixed curriculum, set class schedules, and assessments. Degrees are widely recognized and accepted as a standard qualification for many professions. Meanwhile, the term "non-traditional programs" offers flexibility in duration and pacing. Learners might complete modules or courses to earn more minor, targeted credentials and study at their own pace. Additionally, a flexible pathway allows learners to accumulate accomplishments from smaller learning units to gain a certificate or a full degree. In this regard, the duration of an alternative or non-traditional program is often shorter than that of a formal higher education program that leads to the award of a degree. (Kato et al., 2020; Tanprasert, 2021; UNESCO, 2018).

Identifying learner characteristics and preferences patterns may contribute to developing the curriculum and teaching of higher education institutions that accommodate students' learning needs. Researchers have explored learner characteristics such as personality traits, cognitive and emotional aspects, and technology preferences to understand groups of learners. In this paper, the authors adopted self-efficacy and motivation as psychological characteristics under the study. Students' efficacy, as a central determinant of the success of high school to university transitions, was explored in the academic context (Svartdal et al., 2021), and their motivation was explained through the framework of achievement goal (Elliot, 1999) herein, referred to as learning motivation. Past research found that self-efficacy and motivation are significant predictors of academic achievement (Chemers et al., 2001; Rhew et al., 2018). This study will consider the two characteristics of Thai high school students in answering the research questions that ask:

    (1) Are there clusters of students based on their study efficacy, learning motivation, and learning preferences?

    (2) Are there differences in students' study efficacy, learning motivation, and learning preferences between student clusters?

Literature Review

Study Efficacy

Self-efficacy is a belief in one's ability to organize and execute actions required to succeed in particular circumstances (Bandura, 1997). Efficacy influences a person's effort and perseverance when facing challenges and failures. Generally, an individual's self-efficacy is related to persistence and achievement. Previous studies addressed the evidence that self-efficacy affected performance in specific cognitive abilities (i.e., longer persistence and better strategies in solving mathematical problems) (see Chemers et al., 2001).

Study self-efficacy (SSE) is students' belief in their ability to successfully plan and implement student activities (Bandura, 1997). In an academic context, a previous study found self-efficacy influenced academic motivation as the choice of activities, level of effort, persistence, and emotional reactions. Students with high academic self-efficacy use more effective cognitive strategies in learning and are better at monitoring and regulating their efforts. Compared to students with lower academic self-efficacy, those with higher self-efficacy tended to be more enthusiastic about participating in activities, persevering through setbacks, and experiencing fewer negative feelings when they failed (Zimmerman, 2000). Although academic self-efficacy is related to past academic achievement, studies have found that interventions based on social cognitive theory in educational programs (e.g., embedding mastery experiences) may enhance self-efficacy (Svartdal et al., 2021).

Chemers et al. (2001) studied the association between academic self-efficacy in first-year college students' performance and adjustment and found that self-efficacy beliefs affect academic commitment. According to Klassen et al. (2008), study self-efficacy is one key factor for applying study skills into action. They found that undergraduate students with lower self-efficacy were more likely to procrastinate on daily academic work and had significantly lower GPAs. In the study of Svartdal et al. (2021), self-efficacy influenced the relationship between study habits and procrastination but with different effects as a predictor of performance at early versus later study stages.

Learning Motivation

An essential process in motivation, according to Socio-cognitive theories, is goal setting. Elliot and Church (1997) researched the trichotomous conceptualization of achievement goals and found empirical support for the framework (see Elliot & Church, 1997). Two types of performance goals - performance-approach and performance-avoidance goals - represent separate, independent achievement orientations. Performance goal is associated with a task that focuses on demonstrating competence relative to others or competition, whereas performance-avoidance goals focus on not performing poorly relative to others. For mastery goals, the individual focuses on developing competence through task mastery, relevance, or meaningfulness. These three types of achievement goals are competence-based goals that are widely adopted in educational studies. While mastery goals positively related to the facilitation of interest and negatively related to evaluation focus and harsh evaluation, performance-approach goals were positively related to evaluation focus, and performance-avoidance goals were positively related to evaluation focus and harsh evaluation (Elliot, 1999; Elliot & Church, 1997).

According to Schunk et al. (2007), the performance-oriented individual is driven by the desire for public recognition and how one's competence will be evaluated in relation to others. Students with performance orientation will be motivated to be seen as the best in the group but to avoid judgments of low ability. On the contrary, students with mastery orientation are motivated to learn under one's standards, acquire new skills, improve competence, and accomplish something challenging. In the views of Zentall and Morris (2010), task persistence and self-evaluation are two potential underlying components of motivation. Students who negatively self-evaluate might think they would fail before starting the task or select an easy task to prevent unfavorable outcomes or to hide their inability.

Although motivation towards learning is a personal characteristic, some prior research found that institutional characteristics can influence students' goal orientations. In the study of Koul et al. (2009), students from vocational colleges were significantly more performance and identification goal-oriented than the students from higher education institutions. Performance-oriented students would be likely to engage in social comparison. Students who value the university degree program relative to the diploma program in vocational colleges could feel inferior or superior to other students.

Methods

Participants

The target populations were high school students in grades 10 and 11 from schools under the Ministry of Education (MOE) and Ministry of Higher Education, Science, Research and Innovation (MHESI) in Thailand. Public and private schools represent the school under MOE. Public school education in Thailand is free of charge for Thai nationals until grade 9. Public schools follow a standard, government-approved curriculum catered to students of all types. Resources are generally from their funding in private schools, and the tuition and fees are significantly higher than in public schools.

Under MHESI, the Engineering Science Classroom (ESC) and Demonstration School were included in the study. ESC is part of the Science Classrooms in University-Affiliated School Project (SCIUS) - a budget-funded project from MHESI. The primary mission of ESC is to build science, technology, and engineering human resources who have the skills to create and develop technology and innovation to meet the target industries according to the country's strategy. School administration and curriculum are associated with a university and used in teaching training programs for demonstration schools.

Samples were drawn from multi-stage random sampling. Finally, survey data was collected from 1,137 students. There were more female students (n=760, 66.8%) than male students (n=332, 29.2%). Over half of the students were Grade 10 (n=638, 56.1%), followed by students from Grade 11 (n=499, 43.9%). Equally, one-third of the students were from Demonstration and public schools (n=335, 29.5 %). The rest were from ESC (n=240, 21.1%) and private schools (n=227, 20 %).

Most students were from Science-Mathematics majors (n=789, 69.4%), while Mathematics-English majors and language majors were equally represented (n=174, 15.3%). Note that around one-third of Science-Mathematics students were from ESC (n=240, 30.4%), Mathematics-English students mainly were represented in Public school (n=82, 47.1%), and

Language-major students were closely distributed in Demonstration school (n=61, 35.1%) and private school (n=60, 34.5%).

Questionnaire

The online questionnaire comprised two parts. Part One used the checklist questions asking students to identify their characteristics, including age, year level, major, and perceived academic achievement. An open-ended question asks students about the discipline they would like to study in higher education or pursue as a career.

In Part Two, students were asked to rate 15 items on a 1-10 semantic differential scale. The questions were "How much are you interested in the characteristics of (study in higher education) listed below? Only the poles (1=Not interested and 10=very interested) were labeled. A principal components factor analysis was used because the primary purpose was to identify and compute composite scores for the factors underlying the items. Varimax and oblimin rotations identified two factors with an Eigenvalue > 1, explaining 59.39 % of the total variances for the items. Two factors were the preference for the traditional approach (three items), which accounted for 44.926 % of the total variance, and the non-traditional approach (twelve items), which accounted for 14.466% of the total variance. Sample items related to the traditional approach were "the length of study is generally semester-based to receive a degree certificate." Sample items related to the traditional approach were "Choose the study topic as you want, then submit evidence to evaluate whether you have the ability and do not care about the degree." Cronbach's alphas for the traditional and non-traditional approach items were .76 and .96, respectively.

Next, the Student Study Efficacy Scale (SSES) was adapted from Svartdal et al. (2021) to measure students' confidence in their ability to achieve desired academic outcomes. Items were rated on a five-point Likert scale (1=strongly disagree to 5=strongly agree). The three first items were reverse coded. Confirmatory factor analysis (CFA) was used to investigate the construct validity of the scales. The Root-mean-squared error of approximation (RMSEA) value = .09, Standardized Root Mean Square Residual (SRMR) = .00, Comparative Fit Index (CFI) = 1.00. The indicators show the model fit according to theoretical support. That means SSES comprises three aspects, including confidence in the utility of study skill habits (i.e., "I have little faith in my ability to study effectively"), general outcome expectations (i.e., "I am sure that I will accomplish the academic goals I have set for myself"), and persistence item ("When I have decided to complete something important to me, I continue even if it proves more difficult than I believed"). Cronbach's alphas for the utility of study skill habits and general outcome expectations items were .82 and .46, respectively. In the present study, low reliability in the items related to the general outcome expectations aspect could be due to the neutrality or non-specific study contents that the items addressed. As Honicke and Broadbent (2016) noted, self-efficacy measures that contain content-specific scales are likely to gain higher levels of internal reliability than general self-efficacy scales. It should be noted that the questionnaire used the Thai language. The authors used back translation to re-translate items from Thai to English. The wrong words or sentences were corrected to match the original English version.

Eighteen motivational items were adopted from Elliot (1999) and the Thai version from Paleenud et al. (2023). Items were rated on a five-point Likert scale (1=strongly disagree to 5=strongly agree). Confirmatory factor analysis indicates the model fit according to previous theoretical support: CFI = 1.00, RMSEA = .06, SRMR = .02. Sample items included "I am

striving to demonstrate my ability relative to others in this class." (performance approach goal), "My fear of performing poorly in this class is often what motivates me." (performance-avoidance goal), "In a class like this, I prefer course material that arouses my curiosity, even if it is difficult to learn." (mastery goal). Cronbach's alphas for the mastery goal, performance approach, and performance-avoidance items were .74, .77, and .86, respectively.

Results

Around half of the students perceived their academic achievement as average (n=633, 55.7%). Many said they were unsure or unable to rate their academic achievement (n=189, 16.6%). A minority of students perceived themselves as below-average (n=75, 6.6%) and as the top 10% of the class (n=67, 5.9%). Overall, students rated their study efficacy at the moderate level (M=3.41, SD=.62). The dimension of persistence had the highest scores (M=4.13, SD=.85), comparing to the general outcome expectations (M=3.64, SD=.72) and utility of study skill habits (M = 3.02, SD=.87). Students had higher scores in mastery motivation-learning approach (M=3.95, SD=.59) than performance motivation (M=3.13, SD=.84) and performance-avoidance (M=3.07, SD=.94). They indicated higher preferences in non-traditional learning approach (M=8.10, SD=1.50) than traditional learning approach (M=7.14, SD=1.81).

Patterns in Students' Learning Preferences, Study Efficacy, and Learning Motivation

Two-Step Clustering analysis resulted in three clusters of students including (1) Students who neither had a high preference for traditional approach nor non-traditional approach, low-to-moderate efficacy, and moderately mastery-motivated; (2) Students who had high favor for non-traditional learning, least likely of being performance-avoidant, having moderate mastery-motivation, with relatively high persistence; and (3) Students who had strong favor for non-traditional learning, high persistence in efficacy, most likely of being mastery-motivated, also potentially motivated by performance and performance-avoidance.

Students in Cluster One had the lowest preferences for the non-traditional learning approach (M=7.06, SD=1.74) and the traditional approach (M=6.15, SD=1.88) compared with students in other clusters. They had slightly low efficacy in study skill habits (M=2.66, SD=0.76) and moderate efficacy in terms of outcome expectation (M=3.14, SD=0.63) and persistence (M=3.38, SD=0.83). They belonged to a moderate level of mastery motivation (M=3.66, SD=0.54) than performance-avoidance (M=3.38, SD=0.74) and performance-motivation (M=3.24, SD=0.72).

In Cluster Two, students had higher preferences for the non-traditional learning approach (M=8.56, SD=1.01) than the traditional approach (M=7.21, SD=1.46). These students rated their efficacy according to study skill habits and outcome expectation at the moderate level (M=3.24, SD=0.81 and M=3.63, SD=0.60 respectively), except for the aspect of persistence that is rated at the higher level (M=4.38, SD=0.58). Among the three clusters, this group had the lowest scores for the performance- approach (M=2.49, SD=0.60) as well as the performance-avoidance approach (M=2.31, SD=0.73), while having moderate scores of mastery-motivated approach (M=3.85, SD=0.52).

In the last cluster, students preferred the non-traditional learning approach (M=8.74, SD=1.03) and the traditional approach (M=8.18, SD=1.51). This group had the most robust preferences for non-traditional learning among the three clusters. They had moderate efficacy

in their study skill habits (M=3.17, SD=0.95) and outcome expectation (M=4.22, SD=0.51) but high efficacy in the aspect of persistence (M=4.67, SD=0.49) compared to other student groups. This group had the highest scores of motivation aspects: mastery-motivated approach; M=4.40, SD=0.44; performance-motivated approach (M=3.78, SD=0.78); performance-avoidance (M=3.63, SD=0.78).

Differences in Students' Study Efficacy, Learning Motivation, and Learning Preferences Between Clusters

Table 1 showed significant differences according to the study efficacy and learning motivation between the three clusters. Students in Cluster Three had the highest efficacy among the three clusters in two areas: outcome expectation: $F(1137)$= 312.298, p <.01, $\eta2$ = 0.355; persistence: $F(1137)$= 405.637, p <.01, $\eta2$ = 0.417). For the area of study skill habits, students in Cluster Two had higher efficacy than the other groups (M=3.24, SD=0.81). However, the difference is not significant: $F(1137)$= 56.163, p <.01. Students in Cluster Three had the highest scores of motivation-learning approach in all dimensions, mastery: $F(1137)$= 209.672, p <.01, $\eta2$ = 0.270); performance: $F(1137)$= 357.797, p <.01, $\eta2$ = 0.387); performance-avoidance: $F(1137)$= 338.165, p <.01, $\eta2$ = 0.374). Students in Cluster Three have higher preferences for both traditional approach (M=8.18, SD=1.51) and non-traditional approach (M=8.74, SD=1.03) than other clusters and the difference is significant: traditional: $F(1137)$= 141.965, p <.01; non-traditional: $F(1137)$= 187.211, p <.01. Except for the slight mean difference (0.18) of preferences of non-traditional approach between Cluster Three and Cluster Two that is not significant.

Table1: *Means, Standard Deviations, and One-Way Analyses of Variance in Study-Efficacy, Learning Motivation, and Learning Preferences between Clusters*

Characteristics	Cluster 1 (n= 383)	Cluster 2 (n= 407)	Cluster 3 (n= 347)	Total (n=1,137)	F	P
	M (SD)	*M (SD)*	*M (SD)*	*M (SD)*		
Self-efficacy						
Utility of study skill habits	2.66 (0.76)	3.24 (0.81)	3.17 (0.95)	3.02 (0.88)	56.16	.000
General outcome expectations	3.14 (0.63)	3.63 (0.60)	4.22 (0.51)	3.64 (0.72)	312.29**	.000
Persistence	3.38 (0.83)	4.38 (0.58)	4.67 (0.49)	4.13 (0.85)	405.63**	.000
Motivation						
Mastery	3.66 (0.54)	3.85 (0.52)	4.40 (0.44)	3.95 (0.59)	209.67**	.000
Performance	3.24 (0.72)	2.49 (0.60)	3.78 (0.78)	3.14 (0.85)	357.79**	.000
Performance-avoidance	3.38 (0.74)	2.31 (0.73)	3.63 (0.78)	3.07 (0.95)	338.16	.031

Differences in Student Cluster Membership

A Chi-Square Goodness of Fit Test was performed to determine whether the student cluster membership proportion differed. As shown in Table 2, student cluster membership significantly differed according to the school type, $X^2(6, N=1,137)$ =24.05, p=.001; major, $X^2(4, N=1,137)$= 16.82, p=.002; and perceived academic achievement, $X^2(6, N=1,137)$=70.32, p=.000. The proportions also differed by students' interest to study higher education in Health, $X^2(2, N=1,137)$ =11.14, p=.004 and Natural Science-Math, $X^2(2, N=1,137)$ =9.28, p=.01. The distribution of students who did not address particular interest were also significantly different among clusters, $X^2(2, N=1,137)$ =16.34, p=.000.

Table 2: *The proportion of Students' Year Level, School Type, Major, Perceived Academic Achievement, and Higher Education Field of Interest between Clusters*

Characteristics		N	Cluster 1 (n= 383)	Cluster 2 (n= 407)	Cluster 3 (n= 347)	X^2	P
			% within characteristics				
Year level	Grade 10	638	35.1	34.3	30.6	1.754(2)	.416
	Grade 11	499	31.9	37.7	30.5		
School type	ESC	240	31.7	44.2	24.23	24.050(6)**	.001
	Demonstration	335	32.2	40.9	26.9		
	Public	335	35.2	29.3	35.5		
	Private	227	35.7	29.1	35.2		
Major	Science-Math	789	31.3	38.8	29.9	16.825(4)**	.002
	Math-Eng	174	38.5	24.1	37.4		
	Language	174	39.7	33.9	26.4		
Perceived academic achievement	Below average	75	50.7	26.7	22.7	70.325(6)**	.000
	Average	633	33.6	39.1	28.3		
	Above average	240	20.4	30.4	49.2		
	Not sure	189	43.9	38.6	17.5		
Field of interest (ISCED-referenced)	Health	393	27.7	36.9	35.4	11.144(2)**	.004
	Engineering	136	25.7	43.4	30.9	5.389(2)	.068
	ICT	29	31.0	34.5	34.5	.230(2)	.892
	Art & Humanities	112	33.9	41.1	25.0	2.208(2)	.332
	Education	3	0	66.7	33.3	1.822(2)	.402
	Natural Science-Math	35	22.9	60.0	17.1	9.284(2)**	.010
	Business Administration & Law	98	35.7	29.6	34.7	1.897(2)	.387
	Social Sciences	65	43.1	38.5	18.5	5.226(2)	.073
	Agriculture	9	44.4	22.2	33.3	.802(2)	.670
	Service	54	44.4	18.5	37.0	7.465(2)	.024
	Do not know	203	45.8	28.6	25.6	16.340(2)**	.000

**p <.01.

Half of the students (50.7%) who perceived their academic achievement as below average and 43.9% of students who were not sure to rate their academic achievement represent Cluster One. Almost half of the students (49.2%) perceive they are above average, however, overwhelm the population in Cluster Three. The most extensive distribution of students who perceive they are at the average (39.1%) is in Cluster Two. Most students will likely opt for Health discipline in their higher education (n=393). They are closely represented in Cluster Two and Cluster Three (36.9% and 35.4% respectively). Around forty percent (41.1%) who reported their interest in Engineering belong to Cluster Two, followed by Cluster One (33.9%). Many students do not identify any discipline, and almost half (45.8%) are in Cluster One.

Almost half of the ESC students (44.2%) and Demonstration students (40.9%) are in Cluster Two, while a minority of them are in Cluster Three (ESC, 24.23%; Demonstration, 26.9%). At the same time, students from Public and Private schools are closely distributed in Cluster One (Public, 35.2%; Private, 35.7%) and Cluster Three (Public, 35.5%; Private, 35.2%). Regarding students' majors, the largest number of students in Science-Math are in Cluster Two (38.8%), while the rest of them are evenly distributed in Cluster One (31.3%) and Cluster Three (29.9%). The highest proportion for math-English and language students is Cluster One (Math-English, 38.5%; language, 39.7%).

Discussion

The findings showed patterns of student characteristics between clusters. Cluster One comprised most students who needed to be more sure of their academic performance level and over half of the students who viewed themselves as below average of their peers. Compared to other groups, they had low efficacy in study skill habits and moderate efficacy in outcome expectation. These students might need help to target their learning effectively and are less motivated to pursue any specific plan in continuing higher education because low study self-efficacy might negatively affect ambition, motivation, effort, and persistence (Bandura, 1986). Classroom anxiety (i.e., fear of failing and being negatively evaluated) is an essential aspect of negative motivation and self-efficacy (Bandura, 1997). Koul et al. (2012) found that classroom anxiety was positively associated with performance-avoidance goals toward learning biology and physics in male students. When students are not highly motivated to achieve specific academic goals, their choices and expectations in the transition to higher education could be very flexible. They were more likely to be less determined whether to follow the structure of a degree program or progress their study at their own pace. This was also consistent with the findings that this cluster significantly had more students who did not address particular interest in any discipline when furthering higher education than the other two clusters. For most of the language students who were clustered in this group, their motivation to initiate learning and sustain the learning process would be challenged by disruptive technology (Sumakul et al., 2022). The advancement of technology affects how teachers teach and students learn, particularly in language teaching and learning in the context of language learning (Dörnyei & Ryan, 2015). In addition, students' preferences might be dynamic and challenging to specify since language skills are transferable skills that can work across degrees and career paths.

Meanwhile, Cluster Three students with the strongest preferences for traditional and non-traditional learning reported a high degree of study efficacy and mastery of learning motivation. Two distinct learning approaches could be appealing options for developing competency due to students' confidence in their abilities. This aligned with the extensive distribution of Cluster Three students who perceived their academic achievement was above average and reported high study efficacy. For mastery-oriented students, traditional undergraduate degree programs or self-paced, competency-based learning approaches could match their study interests. For them, learning achievement was less likely to depend on the specific predetermined approach but on the relevance and meaningfulness of learning (Elliot, 1999). As these students indicated the moderate motivation in performance-oriented and performance-avoidance, negative or positive results of their expected learning could influence their decision to choose experiences in traditional undergraduate programs or other alternative credentials.

Although students in Cluster Three had the highest preferences for non-traditional learning, the slight difference between Cluster Three and Cluster Two was insignificant. Their preferences aligned well with low performance and performance-avoidance orientation. They tended to be less likely driven by competing for achievement and had less anxiety about avoiding failure in learning while feeling motivated to learn for their mastery. These students were not likely to pursue higher education with a priority of completing a degree with an impressive grade-point average (GPA). An appealing approach should allow them to fulfill their meaningful learning rather than to compare or compete with other students. This was consistent with the study of Abramovich et al. (2013) that argued for reframing badge use in educational deployment to be more intrinsic, in which students would use a badge to present

evidence of their learning and growth. Half of the ESC and Demonstration school students were clustered when considering the cluster membership from the school type. That means most preferred to pursue learning that allowed them to acquire skills in a less structured environment than traditional undergraduate degree programs offered. The predominant goal orientation could vary with learning opportunities and emphasis in different institutions (Koul et al., 2009). However, ESC and Demonstration school curricula are associated with the university and are under MHESI; students could be fostered, to a certain degree, through the school environment and curriculum that are affiliated with the university.

Implications

The large number of Science-Math students represented in clusters that addressed high preferences for non-traditional approaches indicated the opportunity that alternative learning platforms might apply to science and technology education. Higher education institutions aiming to deploy alternative learning approaches might prioritize Cluster Two students who explicitly preferred the non-traditional approach. In Cluster Two, most students were from Engineering Science Classrooms (ESC) and Demonstration schools where teaching and curriculum are associated with the university. Higher education institutions should enhance synchronization between the schools and universities to prompt students' interest and promote students' accessibility to non-traditional learning. As language-major students reported lower confidence and preferences for any learning approaches, approaching them with communication that empathizes with their concerns would be helpful, facilitating students to set academic goals, explore study choices, and review potential learning paths.

Limitations of the Study

The authors were aware of the potential limitations in generalizing findings across diverse populations. The study did not include students from international schools whose curricula adhere to a wide range of frameworks, such as American, Canadian, and Australian curricula.

Given the complexity of learner characteristics, consider adopting an interdisciplinary approach that incorporates insights from psychology, sociology, and other relevant fields to provide a comprehensive understanding of learners.

Acknowledgments

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The Impact of Game-Based Learning on First-Year Undergraduate Students on Knowledge and Motivation: An Example From the Logistics Field

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Abstract
The paper aims to study the impact of utilizing the learner-centered framework on Game-Based Learning (GBL) on first-year university students. The objectives of the study are 1) Game-based learning can achieve knowledge for the learner. 2) Game-based learning can create student learning motivation. The game implemented in this study is called Beer Game, which is a web-based role-playing simulation of beer distribution in the supply chain. The sample was 42 students who studied the Introduction to Logistics and Supply Chain Management subject. To measure knowledge level, the samples got the tests before and after playing the game. (Pre-test and Post-test). To evaluate the learner motivation level, the study used satisfaction questionnaires. The result of the level of knowledge of samples showed that 95.12 percent of total sample students got a better score, on the Post-test than on the Pre-test. The learner motivation survey showed the average ($\bar{x}$) was 4.62/5.00 meaning it was very satisfied with game-based learning. In conclusion, Game-Based Learning (GBL) can create learning motivation and knowledge for first-year undergraduate students.

Keywords: Game-Based Learning (GBL), Beer Game, Supply Chain, Logistics, Learner-Centered

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Introduction

In education, teachers are currently confronted with the dual challenge of cultivating student learning motivation while concurrently elevating their knowledge levels. The responsibility on teachers has intensified as they seek effective methods to render the learning process engaging and enjoyable. In light of this, Game-Based Learning (GBL) emerges as a promising pedagogical approach. Notably, for first-year students, educators grapple with a spectrum of challenges encompassing diverse backgrounds, motivation and engagement, the transition to higher education, foundational knowledge gaps, and the cultivation of study skills, technology integration, and more (Naong, M. et al., 2009). Consequently, creating an environment that captures the attention and provides a positive learning experience for first-year students is imperative for educators.

The primary objective of this research is to substantiate the notion that GBL holds the potential to enhance both student learning motivation and knowledge. By leveraging games as educational tools, teachers can create an environment that not only stimulates interest but also augments the overall learning experience for students.

Game-Based Learning (GBL)

Game-Based Learning (GBL) facilitates immersive learning experiences in a virtual environment, allowing students to practice and reinforce specific skills, knowledge, or behaviors (Jan & Gaydos, 2016).

Games, in this context, play a role in promoting logical and critical thinking, as well as contributing to the development of social skills, language abilities, communication skills, and creative and problem-solving capabilities (McFarlane et al., 2002).

Educational games are considered to have the potential of deeply engaging learners with any topic, allowing active participation in learning process (Wallner and Kriglstein 2011).

Beer Game

A well-known and widely used simulation game in the field of logistics and supply chain education is called the Beer Game. The Beer Game is a simulation that immerses participants in the common coordination challenges encountered in supply chains. Originally conceived at MIT (USA) in the 1960s, this role-play simulation offers an experiential understanding of supply chain dynamics. The purpose of the Beer Game is to experience systemic effects and to introduce the need for supply chain and network management, and to minimize inventory cost and backorder cost.

The Beer Game involves a four-part supply chain with a retailer, wholesaler, distributor, and factory, each managed by a separate person. In this team game, each player is responsible for managing the inventory of one echelon by placing orders. The orders and beer cases move in opposite directions. The goal is to minimize the total cost incurred by the team for each echelon, calculated by adding up inventory and backlog costs at the end of each simulated week (Sterman, 1989).

Lately, a developer has transformed the traditional board game of Beer Game into a web-based version available for free play on the internet. This study utilizes the web-based edition

developed by MA-system, a Swedish consulting company specializing in business logistics. Drawing inspiration from the original board game, this version streamlines the mechanics to make it more user-friendly.

Methodology & Research Design

The research aims to investigate two main objectives:
      1) Game-based learning (GBL) can achieve knowledge for the learner.
      2) Game-based learning (GBL) can create student learning motivation.

This study utilizes an experimental approach, wherein a designated class engages in playing a specified game. Data collection is conducted, and subsequent analysis is carried out to draw meaningful insights from the gathered information.

The Research Sample

- The participants consist of first-year students enrolled in the Logistics Technology bachelor's program at Rajamangala University of Technology Isan, Thailand.
- This research pertains to the Introduction to Logistics and Supply Chain Management subject.
- The game used for Game-Based Learning is the Beer Game Simulation, a web-based version created by MA-system, a Swedish consulting company specializing in business logistics.
- The sample size comprised 42 students (n=42).
- Experimental data collection occurred during the first semester of 2022 (October, 2022).

Data Collection and Data Analysis

1. To assess students' knowledge levels gained from Game-Based Learning (GBL) activity:
    - A Pre-test was administered before engaging in the game, comprising 10 questions covering all the knowledge objectives of the game.
    - Implementing a Post-test to determine whether students acquired the necessary knowledge to successfully complete the GBL activity; the post-test mirrors the pre-test.
    - Analyzing pre-test and post-test results using statistical measures such as Mean ($\bar{x}$), Standard Deviation (S.D.) and Percentage (%).
2. To evaluate learner motivation levels stemming from GBL activity:
    - Employing satisfaction questionnaires based on the Likert Scale.
    - The questionnaires are segmented into three sections: Learning Motivation, Learning Effectiveness, and Satisfaction Overview.
    - Examining the outcomes using statistical measures, including Mean ($\bar{x}$), Standard Deviation (S.D.), and Percentage (%).

Finding & Conclusion

1. To assess students' knowledge levels gained from Game-Based Learning (GBL) activity:

Before engaging in Game-Based Learning (GBL), the participating students were required to complete a pre-test using Google Form. They were allotted a time limit of 15 minutes to

answer a set of 10 questions. Subsequently, the teacher elucidated the rules and mechanics of the game.

The gaming session comprised two rounds. The first round served the purpose of familiarizing the students with the game's rules, while the second round involved actual gameplay, with a prize awarded to the winning team. Following the conclusion of the GBL session, the participants underwent a post-test through Google Form, with the post-test questions mirroring those from the pre-test. The comparison of students' scores is presented in Table 1.

Table 1: The comparison of the samples' scores between pre-test and post-test.

Sample	Score	Score	Different	% Different
	Pre-test	Post-test Score		
Student No.1	4	5	1	25%
Student No.2	4	8	4	100%
Student No.3	5	10	5	100%
Student No.4	5	7	2	40%
Student No.5	3	5	2	67%
Student No.6	3	8	5	167%
Student No.7	6	10	4	67%
Student No.8	4	8	4	100%
Student No.9	6	10	4	67%
Student No.10	6	9	3	50%
Student No.11	8	9	1	13%
Student No.12	6	9	3	50%
Student No.13	5	7	2	40%
Student No.14	6	9	3	50%
Student No.15	3	7	4	133%
Student No.16	2	9	7	350%
Student No.17	1	6	5	500%
Student No.18	6	10	4	67%
Student No.19	4	10	6	150%
Student No.20*	6	5	-1	-17%
Student No.21	3	9	6	200%
Student No.22	4	7	3	75%
Student No.23	2	7	5	250%
Student No.24	1	7	6	600%
Student No.25	6	9	3	50%
Student No.26	3	4	1	33%
Student No.27	4	7	3	75%
Student No.28	4	9	5	125%
Student No.29*	6	5	-1	-17%
Student No.30	5	10	5	100%
Student No.31*	6	5	-1	-17%

Sample	Score	Score	Different	%
	Pre-test	Post-test Score		Different
Student No.32	1	10	9	900%
Student No.33	3	6	3	100%
Student No.34	2	7	5	250%
Student No.35	2	7	5	250%
Student No.36	2	8	6	300%
Student No.37	6	9	3	50%
Student No.38	3	9	6	200%
Student No.39	2	5	3	150%
Student No.40	4	8	4	100%
Student No.41	4	8	4	100%
Student No.42	2	3	1	50%
Total	168	320	152	
Average	4.00	7.62	3.62	90.50%
S.D.	1.958879604	1.88630314		

P.S.:* Participants who achieved a post-test score lower than their pre-test score

The findings indicate that 92.85% of the total sample, specifically 39 participants, achieved Post-test scores surpassing those of the Pre-test. The experimental outcomes align with the anticipated results. In specific numerical terms, the average Pre-test score stood at 4 out of 10, while the average Post-test score exhibited a notable increase to 7.62 out of 10, representing a 90.50% improvement.

The teacher conducted interviews with students who scored lower on the post-test compared to the pre-test. During these interviews, it was discovered that student's No. 20 and No. 29 both assumed the role of retailer in both game rounds. They expressed difficulties in managing the supply chain effectively, particularly in coordinating the flow between manufacturer, distributor, and wholesaler roles. As a result, they lacked a comprehensive understanding of supply chain management. Additionally, student No. 31, who played the distributor role, experienced a loss of focus during the game, leading to a lack of comprehension of the rules and underlying theories. This loss of attention contributed to their challenges in grasping the intricacies of the game.

In summary, based on the test scores, it can be concluded that Game-Based Learning (GBL) not only fosters learning motivation but also enhances the knowledge level of the learners. The participants were first-year students enrolled in the Logistics program. The research utilized the Beer Game as the selected gaming approach.

2. To evaluate learner motivation levels stemming Game-Based Learning (GBL) activity:

To evaluate students' learning motivation, the researcher distributed a questionnaire using Google Form, which participants filled out after completing the post-test. The questionnaire employed a 5-point Likert scale to gauge the satisfaction of the respondents, with the scale interpreted as follows: 5 points for extremely satisfied, 4 points for very satisfied, 3 points for neutral, 2 points for slightly satisfied, and 1 point for not satisfied at all. Additionally, the

questionnaires were organized into three sections: Learning Motivation, Learning Effectiveness, and Satisfaction Overview, with the results presented in Table 2.

Table 2: The satisfaction of the learner motivation level from Game-Based Learning (GBL)

Session 1: Learning Motivation	$\overline{x}$	Meaning	S.D.
Game-based learning helps make the classroom atmosphere more interesting.	4.65	Extremely satisfied	0.52
Game-based learning makes it fun for me.	4.60	Extremely satisfied	0.53
Game-based learning is new to me.	4.63	Extremely satisfied	0.57
Game-based learning makes me more interested in the lesson.	4.70	Extremely satisfied	0.51
Game-based learning allows me to understand lessons better.	4.53	Extremely satisfied	0.62
Total Average	4.62		
Session 2: Learning Effectiveness	$\overline{x}$	**Meaning**	**S.D.**
I understood the content logistics and supply chain from the game I played (Beer Game)	4.49	Very satisfied	0.59
The game I played (Beer Game), I was able to understand the process of logistics and supply chain operations.	4.51	Extremely satisfied	0.54
In the game I played (Beer Game), I was able to understand inventory costs in the supply chain.	4.51	Extremely satisfied	0.59
The game I played (Beer Game), I was able to understand an overview logistics and supply chain system.	4.49	Very satisfied	0.59
In the game I played (Beer Game), I was able to find ways to solve problems related to supply chains.	4.53	Extremely satisfied	0.54
The game I played (Beer Game) helped me learn basic logistics and supply chain management courses more easily.	4.56	Extremely satisfied	0.58
Total Average	4.52		
Session 3: Satisfaction Overview	$\overline{x}$	**Meaning**	**S.D.**
Satisfaction Overview of Game-Based Learning Activity	4.77	Extremely satisfied	0.42
Total Average	4.77		0.42

The survey conducted on a sample of students revealed a high level of learning motivation, with an average ($\overline{x}$) score of 4.62 out of 5.00, indicating an exceedingly satisfactory response to Game-Based Learning (GBL).

In terms of learning effectiveness, the survey results indicated that students concurred on the beneficial impact of Game-Based Learning in enhancing their understanding of subjects such as Supply Chain, Logistics, and Inventory Costs. The average ($\overline{x}$) score for this aspect was 4.52 out of 5.00, signifying a high level of satisfaction among the respondents.

Furthermore, the overall satisfaction level of the sample population was notably high, as evidenced by an average score ($\bar{x}$) of 4.77 out of 5.00. This result reflects an exceptional level of contentment with the Game-Based Learning approach.

In conclusion, based on the satisfaction results, it can be inferred that Game-Based Learning (GBL) has the potential to significantly enhance student motivation for learning.

Discussion

Knowledge Level: The research findings reveal that 92.85% of the total sample size, specifically 39 participants, achieved higher scores than the Pre-test. This indicates a favorable outcome in the experimental group, signifying improved knowledge levels among the majority of GBL participants. To enhance understanding of all positions within the supply chain, the teacher should establish a condition requiring participants to switch player roles during the game. Furthermore, playing the game more than twice is recommended to allow participants to rotate through all positions, ensuring a comprehensive understanding of supply chain management.

Learning Motivation: The learning motivation average of 4.62 out of 5.00 is a strong indicator that the game-based learning approach has successfully motivated students. This phenomenon can be attributed to the implementation of collaborative activities involving the students. Specifically, group work was incorporated, wherein participants engaged in playing games under specified conditions for the attainment of prizes. Notably, incentives were awarded to the group demonstrating proficiency in winning, fostering heightened enthusiasm among students for game participation. The deliberate structuring of incentives aimed to cultivate a heightened interest and commitment to the gaming experience, thereby fostering an environment conducive to enjoyable and stimulating learning.

Suggestion

Comparisons with Traditional Teaching Methods: Implications for future research, to provide a comprehensive view, the research should consider comparing the effectiveness of game-based learning with traditional teaching methods.

Student Engagement: Beyond satisfaction, it would be interesting to explore the level of engagement that students experienced during the game-based learning sessions.

Potential Challenges and Limitations: Acknowledge any challenges or limitations encountered during the implementation of game-based learning. This could include technical issues, time constraints, or any difficulties in adapting the method to different learning styles.

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Integrating STEM Education With Local Culture in Indonesia: Teachers' Perspective and Practice

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Abstract

STEM education based on local culture produces a more contextual and meaningful learning experience for students. However, the practical implementation has led to numerous issues. The study aims to describe the challenges teachers face in implementing STEM education based on local culture and explore the teacher practice related to understanding and teaching strategies in STEM education. The total participants were 143 teachers who taught science, social, and other subjects. The data were collected using the survey method and analyzed with descriptive statistics. The results show that 51% of teachers answered that integrating local culture into learning is essential because it can preserve local culture and introduce culture to the younger generation by presenting contextual learning. However, 59.4% of teachers have never applied STEM in learning, and 40.6% of teachers are still confused about its application, even though they have heard of STEM before. The data indicated that the teachers faced many challenges regarding their understanding, practical constraints, teaching strategies, and STEM integrated with local wisdom. Notably, the findings show that most teachers have a lack of understanding of how to link STEM education and local contextual values. The strategy of integrating culture into learning is considered the most effective if it is done by developing teaching materials based on STEM. The implications of teaching strategies of STEM education related to local wisdom are discussed.

Keywords: Local Culture, STEM, Contextual Learning

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Introduction

Indonesia is known to have a rich cultural heritage, which is an important aspect of its national identity. The lack of culture-based learning in schools has become a major concern in education (Susilo & Irwansyah, 2019). Educational curricula tend to ignore society's rich and diverse cultural aspects. The current learning process only focuses on understanding general concepts, which do not integrate local cultural elements. As a result, students lose the opportunity to explore their cultural roots, hindering their understanding of cultural diversity (Affandy, 2017). In this context, the lack of integration of cultural elements in the curriculum affects the overall quality of education. Also, it affects students' understanding of cultural values that influence their daily lives.

One of the direct impacts of the lack of culture-based learning is that few students know their local culture. Students are often more familiar with global culture than their environment. This can result in indifference to local cultural heritage and a lack of appreciation for the values, traditions, and history that shape their regional identity. The small number of students who know their own local culture can lead to a loss of students' sense of attachment to their local community and culture, which is an important element in forming individual identity.

Apart from the lack of culture-based learning and a lack of understanding of local culture, a problem that often occurs in the classroom is an uninteresting and contextual learning process (Firmadani, 2020). Teaching methods that are monotonous and less relevant to everyday life make students feel bored and less motivated to learn (Insani, et al., 2023; Syaparudin, 2020). Contextual learning and linking the subject matter to local culture can make learning more interesting, relevant, and meaningful for students (Anikarnisia & Wilujeng, 2020). This way, students will be more involved in learning and naturally better understand and appreciate their local culture. In line with current technological developments, one of the efforts that can be made to make learning more interesting is to integrate learning with a STEM approach, thereby producing learning with a STEM approach based on local culture.

The STEM approach makes learning more interesting and relevant to everyday life and encourages students to be innovative and creative in designing solutions to face real-world problems. STEM education equips students with the knowledge and skills they need to succeed in the 21st century (Kennedy & Odell, 2023). The STEM approach is very relevant to the demands and developments of the 21st century because it provides a strong framework for teaching students how to think critically and creatively in solving problems (Prasadi et al., 2020; Anikatnisia & Wilujeng, Irhasyuarna, 2022). The STEM approach can also improve students' soft skills, such as communication, collaboration, and leadership, which are very important in the 21st century.

The learning process in Taiwan starts from the STEM curriculum and makes students the center of learning. The curriculum defines five main objectives: increasing students' abilities, involvement, and interest in STEM, increasing teacher capacity and the quality of teaching of STEM subjects, supporting opportunities for STEM education in schools, and promoting effective partnerships (Permanasari et al., 2021). Learning activities the application of the STEM approach can increase student involvement in the learning process so that students will be more motivated and enthusiastic to participate in the learning process. However, the integration of local culture into STEM-based learning is needed to increase cultural preservation (Agusty et al., 2021; Hikmawati et al., 2020; Kartini et al., 2021).

Research by Budiarti (2022) on the development of STEAM-based learning tools to promote the preservation of local culture in Indonesia shows that this approach can increase students' interest and understanding of local culture. However, the initial survey results show that many teachers still experience obstacles in integrating culture and STEM approaches in learning. Teachers do not yet understand the characteristics of STEM implementation, and there is a lack of socialization of local culture in learning at school, so researchers feel it is necessary to examine teachers' perceptions of local culture-based STEM learning. Therefore, this article aims to describe teachers' understanding of STEM approaches and local culture, implementation strategies, and experienced strategies.

Method

This research uses a descriptive approach with a survey method. The number of respondents involved was 143 teachers who taught science, social studies, and other subjects at the junior and senior high school levels. The instrument used in this research was a questionnaire distributed via Google Forms. Data was collected using a survey method and analyzed with descriptive statistics.

Results and Discussion

Researchers carry out needs analysis activities or needs assessments to collect information based on conditions in the field that have occurred so far. The information studied is related to the needs, problems, and challenges that have been faced by the research object and require overcoming.

Based on the survey results, information was obtained that 40.6% of teachers had heard the term STEM but were still confused about its application, 36.4% of teachers had often heard the term STEM but had not fully understood the concept of its application, and only 9.8% had often heard it and had applied it. Although it is not optimal, 11.2% of teachers have never heard of the term STEM. This finding is a reference for researchers that STEM application is still rarely implemented by teachers in schools.

Strategies of Implementation STEM

Besides a survey of teachers' understanding of STEM, researchers also investigated teachers' responses regarding effective STEM implementation strategies. This was done to determine teachers' responses regarding effective strategies for implementing STEM in the classroom learning process. The survey results can be seen in the following graph:
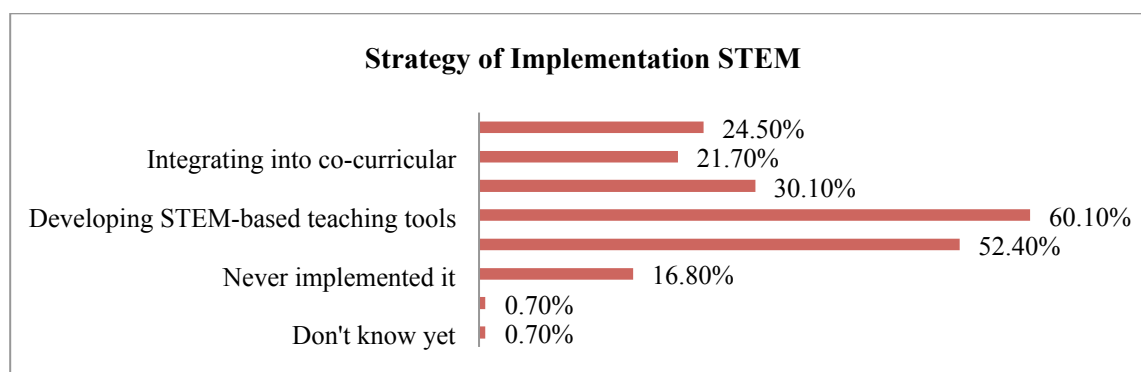

Figure 1. The Strategy of Implementation STEM

Developing STEM-based teaching tools is a strategy that is often chosen by teachers, with a percentage of 60.1%. This follows the results of research conducted by Widiyanti & Mizan (2020), who found that students effectively use the development of learning tools and can improve STEM abilities and 21st-century skills. Furthermore, 52.4% of teachers chose to develop STEM-based media. In addition, 30.1% of teachers chose to integrate STEM intra-curricular, and 24.5% considered integrating extra-curricular as an effective STEM implementation strategy. Based on the data, the researcher obtained information according to teachers' responses regarding the most effective strategy in implementing STEM, namely developing STEM-based teaching tools. Murphy (2023), in his research, found that leadership practices also contribute to the success of STEM education. There are five leadership practices identified as contributing to the success of STEM education in schools, namely utilizing community relations, utilizing local resources, empowering STEM teaching staff, promoting the value of STEM education and supporting STEM pathways.

The Urgency of STEM Education

According to the urgency of STEM, the data revealed teachers' responses regarding the important of STEM education in teaching and learning activities. Survey results regarding teachers' views on the importance of STEM will provide valuable insight into efforts to increase understanding and application of STEM in school learning. Researchers asked questions in multiple complex forms so that teachers could choose several answers to discover teachers' perceptions about the urgency of STEM in learning. The results obtained can be seen in the table 1.

No	The Urgency of STEM in Learning	(%)
1	Have never applied STEM in learning	59.4%
2.	It has been implemented even though the implementation concept has not been maximized	36.5%
3.	Have already implemented and understand the implementation strategy	2.1%
4.	Have applied STEM several times	2%

Table 1.The Urgency of Applying STEM in Learning

Table 1 shows that more than half of the respondents, 59.4% of teachers, have never applied STEM in learning, only 2.1% have implemented and understood implementation strategies, and 2% have applied it several times. This shows a need for follow-up action that can raise teachers' enthusiasm to apply STEM in learning. Based on the results of this research, researchers found that few teachers apply STEM in learning, even though as many as 62% of teachers think that STEM can help students solve problems. The application of STEM in learning activities can train students' skills in developing creativity, critical thinking, collaborating, communicating (4C), and problem-solving so that they can find solutions to problems faced in real life and can convey them well (Astuti et al., 2021; Sarwi et al., 2020). This is in accordance with research conducted by Sudarsono et al. (2022), which found that the problem-solving abilities of students who received learning through STEM improved better than students who received regular learning. Also, 54.5% of teachers think STEM can help students produce products. STEM programs have a positive and significant impact on various grade levels in schools. Overall, students in high school benefit from STEM programs, on average, students outperform their same-age and same-age peers who do not participate in STEM programs (Thomas & Larwin, 2023).

The Barriers of STEM Implementation

The survey in this research was also carried out to find out information regarding the obstacles experienced by teachers regarding the application of STEM in learning. The results obtained can be seen in the following graph:

Obstacles to Implementing STEM

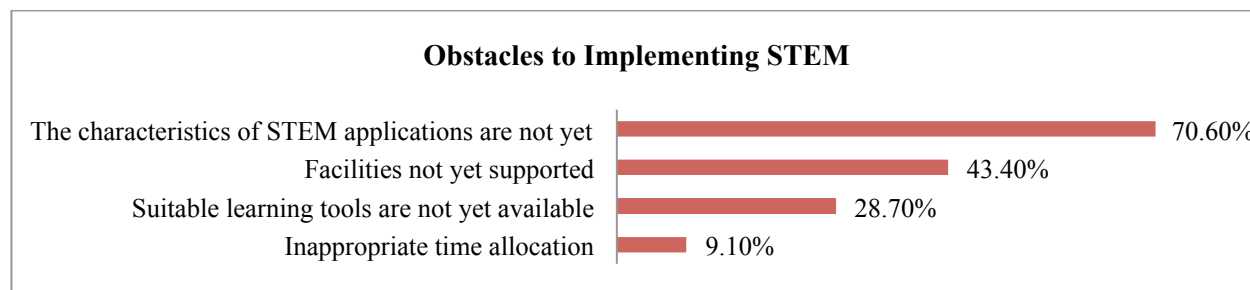| Obstacle	Percentage
The characteristics of STEM applications are not yet	70.60%
Facilities not yet supported	43.40%
Suitable learning tools are not yet available	28.70%
Inappropriate time allocation	9.10%

Figure 2. Barriers of Implementation STEM

Based on Figure 2 above, information is obtained that the biggest obstacle experienced by teachers in implementing STEM is that teachers experience problems with the characteristics of STEM implementation, which are not yet understood in depth. This aligns with research conducted by Diana & Turmudi (2021) that teachers' knowledge of STEM is still dominated by knowledge of what STEM stands for. Then, 70.6% of teachers chose this answer. Apart from that, as many as 43.4% experienced problems with unsupported facilities, 28.7% with unavailability of supporting learning tools, and 9.1% with inadequate time allocation. Based on this data, it turns out that many teachers do not understand in depth the characteristics of applying STEM in learning, so many teachers do not apply STEM in the learning process as per the results of research conducted by Oktavia (2019).

Cultural Integrating Strategies

The integration of local culture in learning is considered important by teachers, and this is proven by 51% of teachers who answered that integrating local culture into learning is very important because it can preserve local culture and introduce culture to the younger generation by presenting contextual learning.

Integrating local culture in teaching materials is the strategy considered the most effective by teachers, with a percentage of 66.4%. As many as 62.2% of teachers chose to package IT-based cultural content as a cultural integration strategy in learning. Other strategies are developing culture-based teaching tools by 53.1% and culture-based media by 42.7%. With this data, researchers can obtain information about an effective strategy for integrating culture in learning by integrating culture into teaching materials. Apart from that, the method of integrating local culture in learning that is considered the most effective according to teachers is the demonstration of local culture at school (75.5%), knowledge management system (57.3%), and local culture FGD between schools and indigenous communities (45 .5%). Integrating cultural values in the learning process has an important role in forming students' personalities (Syarif et al., 2016). Instilling local culture in education is important to instill national identity and identity. This is a strategic step to integrate local culture in learning (Prihatsari, & Widyaningrum, 2021). The presence of learning innovation is very necessary to make learning more enjoyable. One way is to link local culture to learning (Widyaningrum & Prihatsari, 2021).

Integrating Local Culture Methods

Using local culture in learning, either as a learning model, media, or teaching materials, both as a learning model or media, can introduce forms of local culture to students and internalize the values contained in that local culture (Syaputra, 2019). Local culture demonstrations in schools are the integration method most often chosen by teachers, with a percentage of 75%, knowledge management systems with a percentage of 57.6%, and 45.1% of teachers choose local culture FGDs between schools and indigenous communities. In addition, 51.4% of teachers think that teachers need to utilize ICT to integrate local culture into learning. ICT in integrating local culture can be used through a STEM approach. Technology aims to modify the world of science and technology to meet human needs. One of the goals of STEM education is for students to become problem solvers, inventors, innovators, independent, logical thinkers, and technologically literate and able to make connections between cultural history, education, and their knowledge which is applied in real life. Therefore, implementing STEM-based learning integrated with local culture needs to be encouraged among students (Limba & Jamarua, 2021). Technology is essential in shaping STEM identity; the two mutually reinforce each other. Based on research by Sumarni et al. (2020), local culture can also be integrated with religion. Combining religion and culture into science learning will be an exciting combination and a STEM identity needs to be developed based on the differences between students' religious beliefs and learning concepts in the classroom. Yuecheng (2023) stated that although traditional culture and STEM education seem different, there is a relationship between the two, integrating traditional culture and STEM education in education can provide students with more comprehensive and diverse content and broader skills and knowledge for their future careers. Tabarés & Alejandra (2023) in their research stated that culture can provide some potential to encourage an integrative vision of STEM education and other disciplines from the social sciences and humanities.

Conclusion

More than 50% of teachers have never applied STEM in learning. Only 2% of teachers have applied STEM several times, even though teachers think that STEM can help students solve problems, practice 4C skills, and help students produce products. Many teachers do not understand STEM characteristics, and no supporting facilities are available. Apart from that, 51.4% of teachers think integrating local culture into learning is very important, and teachers must utilize ICT to integrate local culture. ICT in integrating local culture can be used through a STEM approach by developing STEM-based teaching tools, as 60.1% of teachers chose to develop STEM-based teaching tools as a strategy for implementing STEM.

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Ritual and Intent in a Renaissance Faire – Taiwan

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Abstract

This action-research explores the effect of intentional embodied ritualization in an advanced college ESL experience. Forty-six sophomore students (from two different classes) were asked to work together to create a complete half-day Renaissance Faire experience for students and faculty at the Soochow University Campus, Waishuangxi, Taipei. Students worked in self-organized teams of 2-8 people. Each team took on the responsibility of bringing a Ren Faire activity to life: there were bards, madrigals, buskers, jugglers, swordfighters, dancers, board-game gamers, and more. Half the students (one class) was asked to create a ritual for their members to conduct prior to the start of the activity and a ritual greeting to use when welcoming attendees at their activity during the Faire. Half the students were asked to create *neither* a ritual for their members *nor* a ritual for greeting attendees/guests. Thus a "test" and a "control" group were established. Following the Ren Faire activity, students reported on their activity, what they learned from the experience, and, for the ritual-makers, how they felt their ritual affected the outcome or appreciation of the activity. Students' after-activity reports showed a distinctly higher sense of achievement when engaged in intentional ritualization. Moreover, after-activity examinations – examination to assess how much students learned from *other* groups – showed that the ritual-makers retained greater historical knowledge and could better express social significance of various aspects of Renaissance culture. Such students also reported greater appreciation for the gains attained during the Ren Faire experience as a whole. Results indicate that intentional ritualization, when properly explained to students and when properly engaged by students, provided markedly improved educational experience.

Keywords: Ritualization, Taiwan, Higher Education, Renaissance Faire

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Introduction

As a researcher of East Asian history and religion, I understand how the concept of *ritualization* is significant to unpacking manifestations of cultural phenomena and social reason. Transformations in orthodoxy and rhetorical narratives are articulated through ritualizing behaviors. As a teacher of university students, I theorized that the concept of ritualization, familiar to anthropologists, might be employed in the educational field, as a tool to enhance students' integration into a topic and provide an embodied, deep learning experience. Ironically, whereas I am an East Asia scholar, my students here in East Asia are all in an English Department; I did not, therefore, bring this concept to life with an Asian-themed activity as I wished to accord more closely with learning objectives of English Department students. Instead, I chose to direct the Sophomore Business English project towards creation of a Renaissance Faire in order to ascertain how intentional ritualization might further learning gains. This allowed students to achieve the learning outcomes previously established for this project-based class, with the added benefit of absorbing additional historical and cultural understanding in their chosen field, English.

Literature Review

Ritual and Ritualization

Ritualization is distinguished from ritual. Ritual is a set of formalized actions that carry symbolic and substantive meaning, usually marking transitions in either personal or celestial conditions, or reaffirming membership in particular groups or sectors of society. Ritual is also purposive,

> …the participants believe that they are accomplishing their aim in what they do . . . this cannot be ignored . . . Day to day social life is perpetually changing; what is relatively constant in it is the part played by ideas and beliefs through which individuals both perceive events and evaluate their own and others' behavior -- what has been referred to has the moral order. To refer to it [moral order] as false, and the untidy process of living as real, is to make a judgement of value by comparing noncomparable [sic] entities, which cannot be helpful. (La Fontaine 1985, pp. 35-36)

Ritualization is a concept that might have been a bit 'avant-garde' in the 1990s but has become increasingly mainstreamed as it has moved from Religious Studies (Durkheim 1912, van Gennep 1906) and socio-anthropology (Tambiah 1979; Bell 1992, 1997) into the fields of political science (Kerter 1988, Fleischer 2010), business and finance (Gonzales); in education, however, the concept is under-utilized and generally understood in terms of a constraining and delimited set of rituals (McLaren 1986, 2000). A clearer and broader look at ritualization may help to lend a new perspective on what ritualization can be to education. Bell's work focuses on the broader social activities and embodied activities in which the performative *ritualization* provides social and symbolic meaning to significant activities. Bell explores four ways in which practices generate meaning: through strategic behavior, situationally, the necessary misrepresentation of its own enterprise, and its potential for redemptive hegemony in its discourse with power. As power is knowing (Foucault), the empowerment of ritualization possesses a powerful potential for learners and educators.

In essence, LaFontaine claims, participants in the ritual accomplish the aims through the ritual because they say they do. Van Gennep introduces the idea of a three-part sequence in

the ritual process which includes: first, separation from normal life or society; next, a liminal state during which the individual, set apart from the normal word (at the limins) experience transformation of self and status; and, finally, an aggregation or reintegration with normal society with the individual becoming 'reborn' into a new state or condition. Turner (1977) extends this 'liminoid' conception, focusing on the fluid, processual nature of ritual rather than the static and the structural. Tambiah focuses attention on contemporary ritual and its meaning in social and political stability and change. He defines ritual as "a culturally constructed system of symbolic communication. It consists of patterned and ordered sequences of words and actions, often expressed in multiple media, the content and arrangement of which are characterized in varying degrees by formality (conventionality), stereotype (rigidity), condensation (fusion) and redundancy (repetition)" (Tambiah 119).

With Catherine Bell's *Ritual Theory, Ritual Practice* (Bell, 1994) sought to break the limitations placed on 'ritual' intent and structure and, like Turner, looked more toward the dynamics of ritual performance. Bell focused on the broader social activities and embodied activities in which the performative *ritualization* provides social and symbolic meaning to significant activities. (Bell 1990) Bell explores four ways in which practices generate meaning: through strategic behavior, situationally, the necessary misrepresentation of its own enterprise, and its potential for redemptive hegemony in its discourse with power. Catherine Bell's seminal work, "Ritualization of Text and Textualization of Ritual in the Codification of Taoist Literature" (*History of Religions* 27.4 (May, 1988), pp. 366-392) explores how the codification of liturgical texts effectively "ritualized" these texts (e.g., made them performative ritual-like actions) by placing them within the spectrum of proper ritual performance. This in turn turned the ritual performance into a significant textual experience through the codification of the ritual texts and the inscription of the ritual itself. These two intertwining dynamics continuously reinforced one another through the empowerment of repeated practice and symbolic iteration that "effectively displaced revealed scriptures as a basis for religious authority and community in early sectarian Taoism." (Bell 367) Neswald (2023-2024) discusses how the intertwining dynamics that Bell has noted involved a concurrent formation of new *rhetorical spaces* – social and existential fields within which a new, potentially disruptive set of concepts and values could find discrete, coherent and socially accepted meaning. (Code 1995) These rhetorical spaces are self-legitimized by exactly those who form them; prosumers acting across social and literary networks whose consumptive patterns legitimize and affirm the legitimacy of the new valuations, actors and their products – poetry, ritual texts. By allowing ritual actors to independently create and be masters of their own ritualizing activities, I theorize that ritualization can form a powerful, creative and innovative classroom dynamic.

For a course in Business English, the Business context of ritualization is also meaningful. Business purposefully explores and employs *ritualization* to create (what Code might consider) "rhetorical spaces": brand communities and loyalty 'membership'. A quick search on Google Scholar or OCLC reveals nearly 3,000 busines-related studies published in the last few years with titles such as "Ritualization: A Strategic Tool to Position Brands in International Markets" (Sharma, Kumar and Borah, 2017), "Ritual and relationships: interpersonal influences on shared consumption" (Gainer, 1995), "Ritual Commerce" (Cook 2023), "Ritualization of Consumer Capitalism" (Gonzales, 2015), etc. In each of these studies, a dynamic relationship is found to arise in the intersection of consumption and ritualization, where ritualization spurs identification, branding and identity building while building reliable consumption patterns among users of particular brands such as "Dove" soap, "Downy" fabric softener or "Starbucks" coffee (See esp. Gonzales, pp. 24-28).

Within Education, ritualization has had a rather different history. A first attempt at bridging these two worlds (education and ritualization) is Peter McLaren's (1986, 2000), *Schooling as Ritual Performance: Toward a Political Economy of Educational Symbols and Rituals*. This study can be best understood as an ethnography of the schoolhouse. And yet, it provides key pedagogical insights. McLaren suggests that students vacillate between two major states, a 'street-corner state' in which students interact 'viscerally' and a 'student state' in which the intellectual is privileged.(McLaren, 218) Within the student state, McLaren suggests, teachers employ both *rituals* to establish intellectual framework for knowledge organization patterns and *ritualizing behaviors* to establish expectations of knowledge acquisition and production patterns. (McLaren, 147-156, 180-186 and 218-219) While McLaren views rituals frameworks and ritualizing behaviors as stultifying in the St. John's catholic school, manifesting negatively and being constraining of individual behavior, the author does provide interesting insight into the potential 'revivifying influence' these rituals could possess as 'conduits of power and creativity.' (McLaren, 218) I have found only one other education study found where a negative, constraining use of ritual/ritualization does not center the work: this is Helen Phelan (2008), where she explores the identity-building effects of ritualization in a musical setting, where community members, both young and old, come together to learn and to create music. In the process of practicing, Phelan finds group and self identity are formed through the storytelling habitus and creative improvisations of the musical community.

I suggest that, for students in project-oriented educational frameworks, ritualizing behaviors can be deployed for this "revivifying influence" as "conduits of power and creativity" where individuals can create spaces of self-authentication and self-affirmation in which they are able to actualize and rationalize current dynamics and situations, and innovate new relationships with the renaissance world to form creative rhetorical spaces for self-learning. These dynamics can be further legitimized through storytelling processes, such as occurs in certain Deep Learning activities. The combination of self-ritualizing, self-authenticating behaviors can help us to draw the perimeters of their real and imagined rhetorical spaces and may assist them to re-create or re-normalize the world and their place in it.

Interpretative Psychological Analysis (IPA)

Interpretive Psychological Analysis (IPA) is a methodology for analysis which aims to provide a "systematic exploration of personal experience" (Thomkins, 2017). As *ritualization* emerged from mythology studies and religious students to become a methodology applied across multiple disciplines, so too has IPA spread from its roots in psychology to become a qualitative method of analysis used across disciplines. (Charlick, Pincombe, McKellar and Fields 2016; cited in Noon). IPA's objective is to understand lived experiences and explore how individuals make sense of their personal and social worlds. (Noon 2018, 75) While Noon and others find IPA an excellent model for qualitative interpretation of personal experience, Noon notes the application to ESL learners and those with less-adequate command of English self-expression. While these issues are noted, the level of students' ability at Soochow and my experience with these students over the year – and for some, over two years – provided me with a reasonable assurance that all students were able to express themselves cogently and coherently. Moreover, the students had nearly three months to complete the project and

report; those with difficulty expressing their ideas had more than adequate time to consider how to express themselves during the oral report.[1]

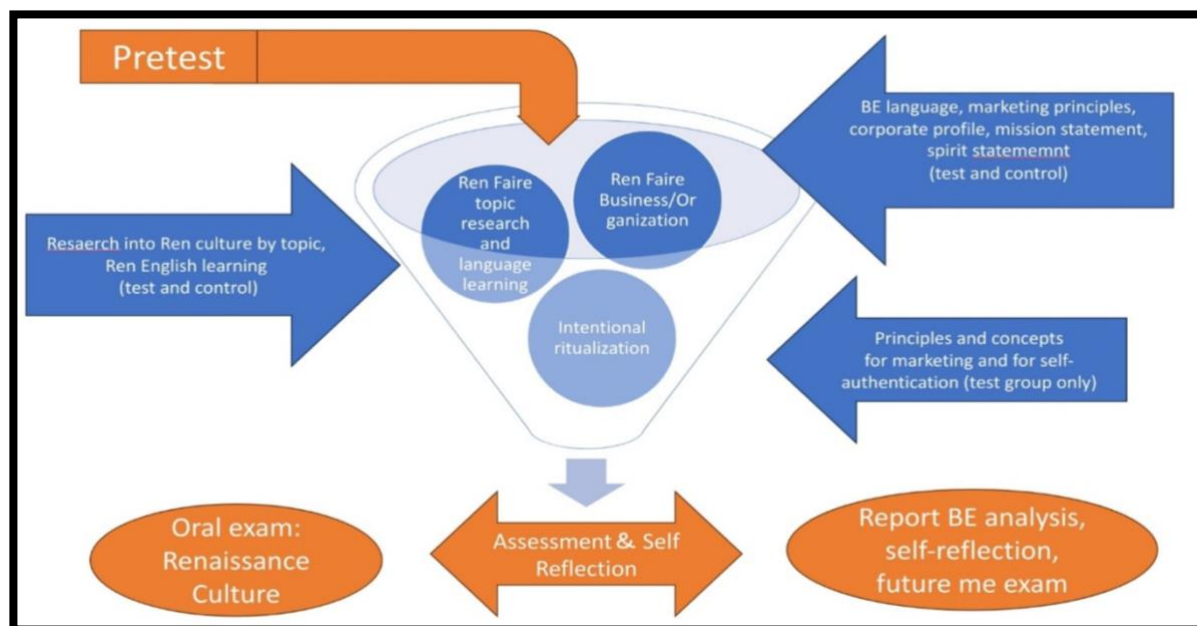**Implementation of the Student Project (The Renaissance Faire)**

Figure 1: Overview of Project Implementation

- o Pre-test: *Initial testing was conducted at the beginning of term in order to establish a baseline of knowledge.*

Prior to the start of this activity, these Sophomore students were questioned to assess their overall knowledge of Renaissance England. Most of these forty-six sophomore students were only vaguely aware of the idea of a "Renaissance" England; those that could place the Renaissance *conceptually* (four students), could not place the English Renaissance *historically*: given a multiple choice question, students universally placed the Renaissance in a period between 1850 and 1920. However, *every* student had heard the name *Shakespeare*. Indeed, students were able to name quite a few Shakespearean plays: six in one class, nine in another. One-third of these students were familiar with the play, *Hamlet;* however, *none* were able to name a single character from the play, including Hamlet himself. When asked about England's Red Queen and White Queen, four students asserted that they knew of both queens: upon further investigation, it became clear they were referring to the characters in *Alice in Wonderland*. Only one student, when prompted to name the *historical* Red and White Queens, was able to associate Queen Elizabeth with the White Queen.[2] When given the name Queen Elizabeth 1 (the White Queen), only one of forty-six had heard of her; oddly enough, this was *not* the same person named in the sentence above. Neither of these two ladies (above) were able to place Elizabeth 1 in history within a 200-year window of accuracy. When asked why Renaissance England is termed "renaissance", one student was able to

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[1] That said, I plan to further enhance this rubric with the inclusion of DL (Deep Learning) with LSP (Lego Serious Play) as a means to prompt students to better express their ideas.

[2] This student spent the first fourteen years of her life in Malaysia. It is possible that this experience accounts for her familiarity with the White Queen: she had seen the BBC film by this name.

accurately guess; no student appeared to rightly know why. This assessment allowed me to proceed with the understanding that I was working with a relatively blank slate. The only real handhold these students had on the historical period was Shakespeare, and even that was, to some extent, fragile.

> o   What is it? *Introduction to the Renaissance English Marketplace and the individuals and businesses found therein.*

The next step was to get students to understand what the Ren Faire could be, and what activities were found there. This could then lead them to understand what they might choose for an organization they could establish within the Ren Faire. The Red and White Queens were invited guests in order to "keep the peace"; to avoid an Alice in Wonderland creation; and, to give students a more popular understanding of the individuals within the marketplace.

> o   Organization of student businesses/organizations and cold contemplation of social significance.

> - o   Swordfighters
> - o   Tailors
>   - o   Tailors
>   - o   Garland/milliners
> - o   Bard and minstrels
> - o   Dancers
>   - o   Carole dancers
>   - o   Maypole – Sauternello dancers
> - o   Calligraphers
> - o   Marzipan and bread makers
> - o   Board-game gamers
> - o   Jugglers/buskers
> - o   (Freshman open theatre)

Table 1: Organizations and Companies Established by Student Groups

At this point, students were asked to assign themselves to a group or an activity. I provided a list of several; some students volunteered their own ideas. In all, some ten activity groups or "organizations" arose (see table 1). Students were asked, cold (without research), to guess at the historical and cultural importance of their chosen topic and, its significance in the lives of three categories of individuals:

a)   royalty & elite society
  a.   children (male, children female)
  b.   adults (male, female)
  c.   the very old (male, female)
b)   middle-class and merchant-class society
  a.   children (male, children female)
  b.   adults (male, female)
  c.   the very old (male, female)
c)   the poor, the indentured, the enslaved
  a.   children (male, children female)

       b. adults (male, female)

       c. the very old (male, female)

In order to facilitate engagement, students were rewarded (with fake money) *attempts* to engage, not rewarded for *correct* answers. Following the discussion, students created individual LINE groups (shared with the prof). They wrote out their answers in class. These responses allowed for a theoretical baseline, for which students could, through research, establish proofs and correct stereotypes.

I then instructed students to begin researching their area of expertise, and to confirm their suspicions about the historical and social importance of these activities at each level of society. Students were required to consult at least three references from books or peer-reviewed articles and to report back in two weeks. In this, students excelled: they had a clear and familiar task: research, summarize, report back. Students reported the results of their research during week 4.

Concurrently, we also began to work on short (20 minute) information-exchange sessions using only Shakespearean English ("conversational" Shakespearean English, including grammar and a limited vocabulary). These sessions began with short question-and-answer exchanges, "How are you?" and the like. Then progressed to "What did you do last weekend?" and on to more complicated response sessions. This segment continued weekly from the 2nd to the 9th week of class, until students were discussing their entire progress in groups using Shakespearean English. Success in this area was patchy: many students were very committed to the project of learning to really speak Shakespearean English; others, less so.

Once students had researched their area of expertise (week 5), they were asked to decide how to bring this activity to life *with authenticity.* The word *authenticity* had already become a hallmark word in both classes: it had been repeated by the instructor at least 3-5 times during each and every class in order to stress the importance of this idea. Students worked together to create as authentic an experience as was materially and financially possible: each student group had been given a budget of only NT\$2,000 (about US\$60). No students chose to do fund-raising to increase this amount;[3] some students took funds from their own pockets to attain results they desired.

As the date of the Faire approached, the concept of ritualization was introduced to the "test" group. One of the two Sophomore Business English classes was asked to incorporate **ritualization** into their activity. They learned the meaning of ritualization, the purpose of performing the ritual for themselves, the purpose of performing the ritual for others, and the desired effects of ritualizing their activity. They were then given an hour of class time to discuss, create and practice their rituals. Emphasis was placed on simplicity: the ritual should clearly be separated in space and time from other activities or actions. But the ritual should not be drawn out: a 30-second ritual was just fine. Because many students are familiar with the triple-bow (in Buddhist and Daoist traditions), the idea of a ritually significant but brief action was not difficult to convey.

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[3] As noted above, this class has been a project-based course, usually involving the creation of a charity or other non-profit action group. In previous years, most projects were funded by student-organized fund-raising efforts; those previous year projects were, however, not organized around enactment of a Ren Faire.

Execution of the Faire: Although designed purposefully to be small, the Ren Faire event had nearly two hundred-fifty participants.[4] The event opening with the bard announcing the opening, and the White Queen and her knight valient welcoming the attendees into the event space. They then encountered the Red Queen and her army of knights. The Red Queen's knight valient threw down the gauntlet, challenging the White Queen's sole knight to a fight. Each of the Red Queen's five knights were defeated in turn in a sword fighting demonstration. Following this, the swordfighting 'business' offered two simultaneous activities: in one, the knights demonstrated to some the history of sword fighting and bladesmithing in Renaissance England; participants of this activity could engage in a series of student-designed games to test their knowledge. Other participants at the sword fighters' arena could learn the basic moves of sword fighting and engage in a duel with one of the knights. These activities continued throughout the four hours of the Faire with individuals in the group taking breaks in turn. At the same time, all other market activities were open and available to attendees. There were marzipan makers offering bread and sweets, and introducing the history of marzipan in Renaissance England and Europe. There were garland makers and bag makers teaching students how to make garlands and the history of fashion in Renaissance England. There were calligraphers demonstrating and teaching calligraphy and its history. Every half hour, there were dancers (two groups) demonstrating and teaching two popular dances of Renaissance England. And there were madrigals and a bard who joined together to announce events and to perform music of the period.

Faculty attendees: 23
Student attendees: 163+
Other attendees: 9+
Student entrepreneurs: 46
Coordinating faculty: 1
External assistants/actors: 2+2

Table 2: Attendance Figures

Each event 'business' had prepared posters conveying information about the history of their event and the social significance of the event (Ex. History and social significance of fashion, of swords and sword fighting, of bards and minstrels, etc.). Some of this information was conveyed in the form of a table game (sword fighters' activity) and engaged battles; some was conveyed by student event organizers as participants engaged in the event (all activities); some was conveyed by activity organizers (all activities); some was conveyed through student-designed games testing and imparting knowledge, some was conveyed via posters set about in the area of each individual activity. There was no attempt to assess the learning outcomes for non-organizing participants; there was an attempt to assess the audience appreciation.[5]

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[4] Disclaimer: These numbers are estimated, as there was a major staff error in the registration of participants; numbers are based on a combination of names on a signup sheet, individuals personally witnessed at the Faire, individuals self-reported (staff, faculty) to be in attendance, and/or those found in video footage of the event.

[5] Audience appreciation was broken down into metrics through which students could assess the relative success of their activity; this relates to the *business* aspect of this Business English course. Details of these learning outcomes are not discussed in this report.

Data Collection and Tabulation

Two types of data collection were applied to this study. A quantitative analysis of results from a final oral exam; and, a qualitative (IPA) analysis of results from an oral report complete with students' self assessment.

Quantitative Analysis

Students were asked to respond to questions within a five minute timeframe. For each question, students were rated on a scale of 1-5 for oral expression, 1-5 grammar, 1-5 depth of knowledge, 1-5 connection of topic to social significance. Oral expression was assessed based on students' fluency, language use, speed of response, and coherence of answer. Grammar was based strictly on the use of appropriate use of tense, pronoun, etc.; if the word was used improperly but coherently (use of *speak* when *tell* would be required), this was considered under oral expression. The other two ratings related to questions that could be answered by anyone mindfully engaging in the Renaissance Faire that our classes put on; topics included court and commoner culture, calligraphy, music and entertainment, bladesmithing [6] and swordsmanship, dances and dancing, fashion and tailoring, food. [7] Because this data was gathered in real time during oral examinations to a large number of individual students, responses for this study were tabulated based only on these four parameters. Raw numbers were further valued as below:

Oral expression fluency, language use, speed of response, coherence	1-5 rating	10 points
Grammar	1-5 rating	10 points
Depth of knowledge Could they identify the subject matter? How much did they know about the history and development of the topic?	1-5 rating	40 points
Connection to social significance Could the students identify social significance at any level? (Level of realm, level of queen and court, level of commoners? Men? Women? Children?)	1-5 rating	40 points
Total points		100%

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[6] Bladesmithing or swordsmithing is the art of making knives, swords, daggers and other blades using forge, hammer, anvil and other smithing tools. (Hriscoulas 1987) *Please note: Bladesmithing has a very deep and rich scholarshipThe definition above has been compiled from a large number of sources, including Wikipedia, OED, Collins and various specialist websites, articles and resources too great to be included in this footnote. As a nod to the recent Harvard scandal, I include this note for clarity. The references given are only partial.*

[7] Food during the Faire was limited to confiserie due to post-COVID considerations. Exam questions were, therefore, also limited to this narrow area of food consumption. There are plans to wide this scope of knowledge in future activities.

Qualitative Analysis (IPA)

Data for qualitative analysis was gathered students' final oral reports, presented in 20-40 minute sessions (depending on group size) over 2 weeks (4 hours) of class time. Students were provided with the questions for the oral report at the beginning of term, and were guided through developing an activity that could accomplish the goals of their term projects. After execution of the Faire, students were asked to privately evaluate one-another and themselves.[8] Students were then given additional self-assessment questions and were asked to consider how they might extend their performance, where they might go with the project should their "business" be incorporated into a formal Ren Faire circuit outside the school curriculum, and what they might do had they better used their funds or had additional funds (limited to NT$2,000 or about US$60) to expend. Finally, students were asked to consider what they learned from the experience and how this experience might help them into the future.

With Noon's very practical guide as reference (Noon, having beautifully considered and applied IPA principles from numerous sources), proceeded to tabulation of data. Reports had two parts:
   a) *a group report* covering various areas of mutual concern (organization of the business, mission and spirit statement, financial report, assessment of business metrics, authenticity of their performance to the specialization (fashion, sword fighting, etc.) , challenges encountered and overcome, etc.); and,
   b) *an individual report*, on what they learned from the experience and how this experience might help them into the future.[9]

Tabulation of data advanced in three steps. ***First***, I focused on individual students' individual performance within the first 'business' considered, the swordfighters. I re-played recordings for each student in the first group, noted down issues and my reflections/responses. I placed each issue into one of two tables, "group data" and "individual data". I then moved to the next student in the 'business', and continued until the first 'business' data was completely tabulated. I then moved on to the following nine student 'businesses.' ***Second***, I organized the various 'issues' into 'themes':
   • *Relationships* (family, friends and relationships, resolution of adversarial relationships);
   • *Education, immediate use:* use of time and efficiency, organizational skills; how to do research;
   • *Well-being and wisdom building:* appreciation of history, desire to travel to England, understanding of literature as a social dynamic, interest in specific cultural themes (dance (6), calligraphy (4), music (2), flight school (1), desire to pursue a career in education or literature (8));
   • *Post graduation interests and guidance*: education or literature (8), further education in business or sociology (6), engagement in business (3), flight school or other non-related interest (5), travel (6), did not mention or did not influence interests (7).[10]

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[8] Freshman students attending this Faire were also asked to respond to a survey on the Ren Faire experience and what they learned from it. Their experiences are recorded in an independent analysis apart from this report.

[9] Students were also encouraged (but declined) to provide feedback to me on what I might have improved upon.

[10] Some students' responses fell into more than one category.

Third, I organized 'themes' across individuals and groups. As this discussion falls largely within the scope of individual experience, the focus herein lies with "individual data." An example of the tabulated data is below.

Relationships family	"This project helped me to better appreciate my mother's role in our family. I really had to get a lot of help from her…" "We ended up having to stay on campus some weekends. I really missed my family." "My sister is a grad student at XYZ university (in USA). She was really impressed… I felt really encouraged [when I spoke to her]."	My response: *unexpected. Student's relationship with mother and appreciation of mother improved.* My response: *workload stress on family relationships* My response: *Relationship with and appreciation of elder sister*
friends and relationships	"Some of the people I thought were my friends were really just using me…" "I felt like the others were not cooperating, and they [made me do most of the work]." "We worked together really well. X and Y have become two of my best friends."	My response: *student realizes used by friends* My response: *student realizes used by friends* My response: *teamwork leads to lasting friendships*
resolution of adversarial cooperation	"They just didn't show up. Finally, I quit this team and joined X."	Mu response: *resolution of adversarial teamwork situation, avoiding conflict; doesn't dare to speak up*

Discussion and Analysis of Results

IPA's objective is to understand lived experiences and explore how individuals make sense of their personal and social worlds. (Noon 2018, 75) For the purposes of the present study, I applied IPA to the analysis of students' final reports self-reflection. In this process, I followed Noon (2018), allowing the flexible nature of IPA frameworks to adjust various steps for the particulars of the present research. Students were asked to assess their own progress in terms of attaining the pre-determined project goals and to consider if/how what they learned during the term could be applied to their future goals. IPA is perhaps the best methodology for analysis, providing a "systematic exploration of personal experience" (Thomkins, 2017).

I also applied a simple oral test-based analysis to learning outcomes to ascertain levels of knowledge attained.

Business English (BE) Related Outcomes

In prior years, the Sophomore Business English Class was established with a) a practical component, b) a research and report component, and c) various conversational exercises. During this experimental year with the Renaissance Faire, these components were retained in modified form.

BE abilities (quantitative)	2024 Test group (ritualization)	2024 Control group (no ritualization)	Compiled data 2022-2023
Creation of *mission statement*	92%	90%	86%
Creation of *spirit statement*	86%	83%	93%
Creation of *project description*	96%	93%	88.5%[11]
Creation of DM (posters, etc.)	92%	86%	Not applied
Use of SMART principles	84%	63%	83%
Creation of *financial plan*	80%	72%	85.5%
Implementation of *financial plan*	84%	72%	84.5%
Reflection on financial planning: Useful considerations offered	52%	56%	Not applied
Ability to use advanced BE language	92%	83%	81%
Reflection on Project and its application to students' future	See IPA assessment	See IPA assessment	Data not recoverable
Self reflection (IPA qualitative)			

Mission and *spirit statements* were assessed based on the a) expression of idea, b) grammar, and c) language use. Scoring of this types remains subjective; however, the Faire groups, as a whole, seemed to have initiative in re-writing and finessing their mission and spirit statements *following* the Faire: their engagement in the activity was of great influence in how they experienced and related to the activity (calligraphy, juggling, etc.) in question. Examples produced and understanding of the use of the mission statement was consistently higher than with those engaging in the Renaissance Faire, with those in the *ritualization group* producing the best examples. However, a great number of students in both groups appeared unable to distinguish mission statement and spirit statement. I suspect this is due to the difficulty in bringing to life an event like the Ren Faire, an event for which students' lacked familiarity. Students in the 2022-2023 'businesses' had formed organizations set in contemporary Taiwan. By the time students were preparing their final report, they most likely set the spirit statement aside as less important than other areas of concern.

Project description scores were significantly higher in both 2024 classes (test/control group). I suggest this has a great deal to do with how seriously students researched their topics/markets. Students in the 2022-2023 groups were asked to research their markets whereas students in the 2024 classes were asked to research their topics. Each student group made great efforts and repeated returned to me for advice on finding resources on their individual topics; this occurred rarely among 2022-2023 groups. This lead to greater excellence in the finished reports and higher excellence in their product descriptions for their 'company profiles.'

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[11] Prior year's groups (3+3 (2022), 4+5 (2023) with 3 disqualified for inclusion of students from different levels or universities, (86+82+73+98+96+92+88+86+97+89+88+87).

Financial planning was a major problem with the 2024 classes. In 2022-2023, no funding was offered to students. They, instead, had to run fundraising activities to raise funds for their 'businesses' and finance their activities. The 2024 classes were provided with funds ($2,000). Spending was erratic most groups underspent (used only part of the allotted funds) rather than make excellent use of the funds on offer. One group (gamers) had even greater, teamwork-related issues. The gamers had split itself into two, jugglers and stilt walkers. Jugglers spent 100% of the funds on juggling equipment, leaving the stilt walker with no funds for renting stilts. The stilt walkers were forced to change their activity late in the term, yet were able to produce an excellent event with near zero funds. An impressive feat.

On the use of *SMART terminology and concepts, t*he Renaissance Faire group members (2024) split dramatically: the Control group members' performance was on a part with the 2022-2023 group members' performance; the Test group members fell far below the Test and the 2022-2023 group members.

In the use of *advanced Business English vocabulary and phrases* (demographics, annuity, etc.)*,* the Control remained on par with the 2022-2023 group members' performance. In this area, however, the Test group members far outmatched both the Control and the 2022-2023 group members.

It appears that, the BE learning outcomes among individuals in the TEST (*ritualization)* group were greater than among those in the 2024 Control and 2022-2023 groups. The use of advanced business English language was best performed by individuals in the *ritualization* group (92%) compared to 81% and 83% among individuals in the Test and 2022-2023 groups, respectively. The greatest weakness among 2024 Control and Test groups was in the area of financial planning. The major difference between the 2024 groups and the 2022-2023 groups is in the provision of funds. I suggest the provision of funds removed from the students a sense of financial responsibility. In future, I plan to remove the provision of funds in future to assess whether this will return to students a sense of financial responsibility and allow them to apply their own financial planning strategies, thus enhancing their learning outcomes in this area.

Cultural/Historical Learning Outcomes

By far the greatest surprise was in the cultural and historical outcomes, where individuals in the Test (ritualization) group outperformed individuals in the Control (non-ritualization) group by an average of twelve points: 96:84. Clearly the cultural and historical knowledge garnered is impressive. How much of this is to due influences of other coursework and how much was due to the activity itself, this is difficult to isolate. However, the questions involved in the discussions (types of blades used in Renaissance England, when and how these blades first emerged, gun powder and guns in relation to swordsmanship's social meaning, the political meaning of Queen Elizabeth 1's adoption of Irish calligraphy, etc.) were closely related to the content to which students were exposed during the Faire. It is hard to imagine this knowledge derived from elsewhere; and, there is a clear indication of dramatic positive movement in these terms.

Personal and Wellness Outcomes

The IPA analysis likewise found that individuals in the Test (ritualization) group expressed much higher levels of satisfaction with the outcome of their performance, greater

appreciation with what they had learned from the experience and greater ability to connect their own learning outcomes with things they might do in the near-or-more-distant future. It was interesting to find that those least able to make these longer-term future connections were also those with difficulty coordinating and manifesting team-building skills.

Those in the 'business' with greatest difficulty coordinating funds (the buskers) (Control group), expressed more anxiety over relationships with both family and friends, and also had greater difficulty manifesting strong teamwork. The strongest and, perhaps, two of the best organized 'businesses' were those found in the Test (ritualization) group, and these individuals expressed zero or low anxiety with friendship, team-building or family relationships; high levels of satisfaction with their performance, and high levels of cultural/historical knowledge retention. This suggests that the use of intentional self-ritualization in this project-based activity has great potential from helping students to organize, plan and implement a longer-term project, to retain and sustain teamwork and a spirit of cooperation, to grasp and retain a sense of the meaningfulness of what they are doing in real time, and cultivate deeper fields of knowledge.

Conclusions and Future Considerations

The impressive differences in learning outcomes between the individuals in the Test (ritualization) and Control groups suggests that intentional ritualization, if properly implemented, can have positive effects on students' learning outcomes, their levels of satisfaction, and their ability to foresee future applications of what they have learned. It will be interesting to follow the careers of the students involved in the Faire, to assess their future choices, and consider how the organizational and cultural knowledge garnered may impact their lives and choices. It will be interesting to repeat this experiment with a second group of students, with enhanced instruction in *ritualization* in business and in self-authentication. The latter would have three aims: first, the aim to verify the results of the first study; second, the aim to create a stable instructional model to apply into the future; third, the aim to provide students with greater awareness of the importance of ritualization in marketing and commerce such that students may apply the techniques with greater zeal and gain greater understanding of the meritswiththeir own intentionally ritualizing actions. Finally, a repeat of the research may allow the implementation to be redesigned in such a way as to avoid the loss in learning gains in the area of budgeting and financial planning.

Note

Appendix can be provided by the author, upon request.

Appendix 1: Table of Learning Components in Prior and Current Years

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A Social Privilege Simulation Game

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Abstract
This study introduces a game for social change designed to allow players to observe and understand the concept of gender privilege and its mechanisms. The game was developed in collaboration between Sapienza University of Rome and The Business Game srl, a company specialist in designing educational games and business simulations. The primary objective of this game is to enable managers and students to closely observe and reflect on the dynamics of gender privilege using a learning-by-doing approach grounded in empathy and critical thinking. Raising awareness about privilege dynamics is crucial for fostering a reconsideration of business activities from a social inclusion perspective, which holds significance for both current managers and the "managers of tomorrow" (i.e., the students). This article presents the rules, settings, and objectives of the game. Furthermore, it discusses the game's predicted outcomes considering relevant literature on privilege, the anticipated learning results and emerging dynamics during the game debriefing. Overall, the aim is to share this experiential learning opportunity and its related findings to encourage educational initiatives focused on sustainable business management and diversity management.

Keywords: Simulation Game, Diversity Management, Education, Privilege

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Introduction

In contemporary society, the intricate web of social dynamics perpetuates a dualistic structure wherein certain individuals benefit from inherent advantages while others groups face systemic disadvantages within the same societal rules (Kolan and Sullivan, 2014; Nixon, 2019). This phenomenon is encapsulated by the concept of social privilege (McIntosh, 1988), which underscores the disparities in power and opportunities that manifest across various strata of society (McIntosh, 1989; Geiger and Jordan, 2014). The delineation of privilege is often evident in gender roles, where individuals find themselves on the social privilege spectrum (Hearn and Morgan, 2010). This paper delves into the exploration of social privilege structures, emphasizing the dichotomy between those who, by virtue of their roles, wield greater influence and those who, under identical rules, face inherent disadvantages.

Navigating the landscape of social privilege is a complex endeavor, requiring a nuanced understanding of the multifaceted dimensions that contribute to its perpetuation (de Beauvoir, 1949). Educating individuals on social privilege necessitates a comprehensive exploration of the intricate interplay between societal norms, historical legacies, and individual experiences (Crenshaw, 1989). Recognizing the complexity inherent in addressing social privilege becomes imperative for creating effective educational strategies that promote awareness and foster meaningful change (Kimmel and Faber, 2010; Volpato, 2013; Gasparrini, 2020).

Against this backdrop, the integration of game-based learning emerges as a compelling solution to navigate the intricate terrain of social privilege. This study introduces a transformative educational game developed collaboratively by Sapienza University of Rome and The Business Game srl, aimed at providing managers and business students (future managers) with a unique opportunity to observe and comprehend the mechanisms of gender privilege. Grounded in a learning-by-doing approach (Kolb et al., 1999; Kolb et al, 2018) the game seeks to cultivate empathy and critical thinking among managers and students alike (Campos Moreirsa et al., 2014; Booker and Williams, 2022). By immersing participants in a simulated environment, the game facilitates a nuanced understanding of privilege dynamics, transcending theoretical knowledge to instill practical skills that can be applied in real-world scenarios (Baldissin et al. 2013).

This paper not only presents the rules, settings, and objectives of the game but also delves into the anticipated outcomes based on relevant literature on privilege. Moreover, it explores possible expected learning results and emergent dynamics during the game debriefing (the post-game phase in which the experience is analyzed and the learning happens; see Crookall, 2010), offering insights into the transformative potential of experiential learning in reshaping perspectives on social inclusion (Hunicke et al. 2004; Kolb, 2015). The ultimate goal is to share this innovative educational initiative, advocating for a paradigm shift in educational approaches towards sustainable business management and diversity management. Through the lens of this game-based learning experience, the paper contributes to the broader discourse on fostering social awareness and equity within contemporary organizational contexts.

Social Privilege

Privilege in modern society is a multifaceted and deeply ingrained phenomenon shaped by historical and systemic structures. The definition of privilege, as posited by Sharma et al. (2018), encompasses a range of systemic advantages or disadvantages conferred upon

individuals based on factors such as gender, race, sexuality, ability, settler colonialism, and class. The concept of privilege, or more precisely, social privilege, originated in 1988 when Peggy McIntosh first used the term and defined privilege as the mechanism that allows a certain category of people to "be able to assume that one's own cultural norms are the norm" (McIntosh, 1988). Since then, various theories and ideas have developed around this theme. The history of the concept of privilege unveils its evolution as a pivotal aspect of social discourse. Over time, various social dualistic structures (such as sexism, heterosexism...) have contributed to the establishment of systemic forces that either privilege or disadvantage specific social groups. This historical context underscores that privilege and disadvantage are deeply rooted societal norms rather than personal developments or individual choices. (Sharma et al., 2018).

The concept of social privilege extends beyond individual behaviors, shedding light on ingrained social norms within various systems of inequality. Nixon's Coin Model (2019) offers a nuanced framework, likening social inequalities to a coin with oppression for disadvantaged groups on one side and privilege on the other. This model distinctly delineates the two facets, positioning them on opposite sides based on established societal rules. Analyzing the dynamics of privilege reveals unique experiences for diverse social groups, yet with a shared foundation, as articulated by M. Kolan and K. Sullivan (2014): privilege forms a self-reinforcing power structure wherein those in authority set the rules. These rules enable them to maintain a dominant position, perpetuating their structural advantage while concurrently exacerbating the structural disadvantage of marginalized counterparts. Illustrating this dynamic, Ferguson (2019) delves into heterosexism: some individuals, by virtue of their alignment with societal norms, openly express affection without fear of discrimination or violence, finding validation in legal frameworks and popular culture. Unlike straight individuals who naturally fit into this norm without choice, their advantage is inherited rather than earned. Often unaware of this unearned advantage, they continue to receive its benefits. In contrast, those identifying as gay, lesbian, bisexual, asexual, or two-spirit do not share the freedom from discrimination. Their natural preferences do not align with the dominant heterosexist norm, resulting in visible, unearned disadvantages. Despite not earning these disadvantages, non-straight individuals receive them nonetheless. The insights from Nixon's Coin Model and the reflections of Kolan and Sullivan collectively underscore the pervasive nature of privilege as a potent force shaping societal structures and reinforcing disparities. In essence, social privilege operates as a self-sustaining mechanism that not only maintains the status quo but also contributes to the perpetuation of systemic advantages and disadvantages among different social groups.

Moreover, to properly understand the concept of privilege, must be considered its intersectional impact, as emphasized by Aulenbacher and Innreiter-Moser (2013) and Fearfull and Kamenou (2010). Intersectionality considers a multitude of factors, including gender, ethnicity, age, disability, class, and sexuality, shaping the complex and interconnected nature of privilege (Williams and Mohammed, 2013; Bailey et al., 2017). Examining privilege through an intersectional lens further highlights the disparities experienced by different groups. While the dynamics of privilege affect men and women differently, black women, in particular, face compounded challenges resulting from the intersection of race and gender (Curti, 2007; Pepicelli, 2017). Similarly, non-binary individuals navigate unique challenges within the spectrum of privilege, emphasizing the need for a nuanced understanding of the intersections between various identity markers (Cancela et al., 2020).

To comprehend and address privilege effectively, individuals must cultivate specific skills such as empathy and critical thinking (Campos Moreirsa et al., 2014; Booker and Williams, 2022). Empathy enables individuals to understand and share the feelings of others, fostering a deeper connection with the experiences of those facing disadvantage (Ferdman, 2014). Critical thinking, on the other hand, allows individuals to deconstruct societal norms, question assumptions, and analyze the underlying structures that perpetuate privilege (Kanter, 1977; McIntosh, 1988; Minnich, 2005). Recognizing societal advantages not only requires an empathetic approach but also demands a critical examination of one's own beliefs and biases. The development of these skills is crucial for engaging in inclusive processes and practices, as well as for dismantling the myth of meritocracy, which assumes success is solely based on merit and ignores the privileges that accompany it (Sue, 2003). In essence, cultivating empathy and critical thinking is essential for navigating and challenging the systemic forces that underlie the concept of privilege in modern society.

Game Based Learning

The choice of Game-Based Learning (GBL) as an approach to the theme of social and gender privilege is due to the engaging and participatory nature of this educational tool. Games and videogames have been recognized as powerful experiences for training, information, and inspiration (De Lope and Medina-Medina, 2017). Games are structured activities that involve players following rules and objectives to achieve outcomes. They usually include elements of competition, cooperation (sometimes), and interaction, and they most of the time have a win or loss condition (Juul, 2005). The MDA framework (Hunicke et al., 2004) describes how games are designed by breaking them into three components: Mechanics, Dynamics, and Aesthetics. Table 1 shows the definitions of these components and their design counterparts.

Component	Definition	Design counterpart
Mechanics	the particular components of the game, at the level of data representation and algorithms	Rules
Dynamics	the run-time behaviour of the mechanics acting on player inputs and each other's outputs over time	Systems
Aesthetics	the desirable emotional responses evoked in the player, when they interacts with the game system	Fun

Table 1: The MDA framework. Source: Hunicke et al., 2004

GBL is an educational approach merging gaming principles with teaching methods, engages and motivates students in learning (Plass et al., 2015). It integrates problem scenarios and playful contexts to create captivating learning environments (Csikszentmihalyi, 1991). The design process focuses on balancing subject matter and gameplay for an optimal learning experience. GBL transforms students into explorers, encouraging discovery of new concepts instead of memorization (Garris and Diskell, 2002). The key idea is to use games as a central medium for delivering educational content and enhancing the learning experience.

According to Alaswad & Nadolny (2015), the design of learning activities in the GBL framework is intrinsically linked to assessments, game elements, learning goals, and game attributes. Game attributes are features and characteristics that are inherent in the game structure and are likely to initiate and maintain interest in gaming activities. Game elements are common blocks shared by games, but they are not necessarily essential for a game (Deterding et al., 2011). In digital game-based learning, some game attributes (e.g., feedback,

goals, interaction) and game elements (e.g., badges and leaderboards) play a major role in engaging and motivating players (Alaswad & Nadolny, 2015).

GBL enhances engagement on multiple levels, fostering a holistic and immersive experience that supports cognitive engagement (Plass et al., 2015). Unlike traditional learning, GBL includes various forms of engagement, such as affective and behavioral, making it more effective and appealing (Kiili, 2005). Game-based learning, akin to active learning, encourages participation, discussion, collaboration, and problem-solving for higher engagement and knowledge retention. Designing serious game for GBL involves creating educational games, for multiple players on any platform with non-entertainment purposes (Ritterfeld, 2009). Unlike traditional games, serious games prioritize learning outcomes, providing a fun experience for participants to learn about themselves and their interaction with the world (Di Loreto et al., 2012).

GBL in business extends beyond knowledge acquisition, integrating it into business processes and fostering a "systemic perspective" where individuals or teams make choices within the complexity of a company (Goold and Campbell, 1998). The game emphasizes the need for departments to maintain balance internally and with other functions. In the fast-paced business environment, knowledge absorption for new competencies is crucial, necessitating innovative and effective managerial training methodologies such as GBL (Baldissin et al., 2013).
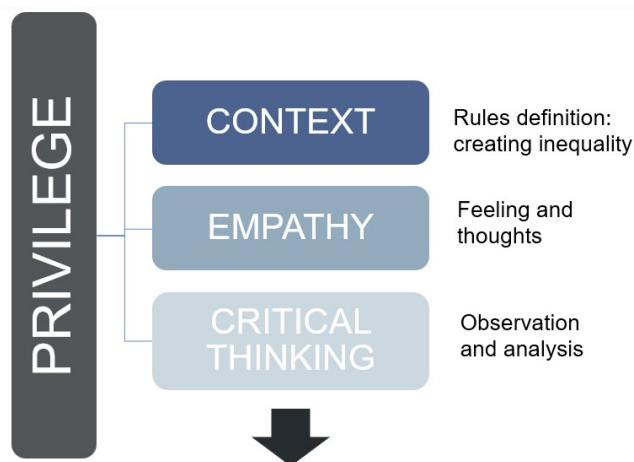
Game Design

1.   The Game

The Social Privilege Simulation Game constitutes an innovative approach designed to address and illuminate societal inequalities through a structured three-step framework, as illustrated in Figure 1. This interactive experience unfolds in a manner that strategically mirrors real-world dynamics, thereby fostering a nuanced understanding of social privilege:

- *Step 1*: In the initial phase, participants are introduced to the game context, inherently instigating an awareness of the rules within the simulated society.
- *Step 2*: The subsequent step encourages participants to delve into the perspectives, thoughts, and emotions of the characters, thereby fostering empathy and facilitating identification with diverse viewpoints.
- *Step 3*: As the simulation progresses, participants are tasked with a comprehensive analysis of various events unfolding during the virtual festival. This critical examination enables players to discern the intricate ways in which these events can influence the participants and their likelihood of achieving success within the game's framework.

Passed these, the gameplay culminates in a pivotal moment of parallelism, drawing explicit connections between the simulated society and the real world. This final phase serves as a catalyst for profound reflection, prompting participants to confront the implications of the game in relation to broader societal structures.

The game incorporates two debriefing moments to facilitate reflection. The first, after Step 3, initiates participants' exploration of their experiences among the simulated society. The second, post-parallelism, delves deeper into the intricacies of social privilege, focusing on introduced categories. This deliberate sequencing enables a gradual unpacking of the concept,

ensuring a nuanced understanding. The Social Privilege Simulation Game not only engages participants in exploring societal inequalities but also strategically scaffolds reflection, offering a multifaceted lens to critically examine privilege within the simulated society and our broader reality.

Figure 1: Social Privilege Simulation Game structure.

2.   *The Application of the MDA Model*

The game is designed in order to reflect the MDA (Mechanics, Dynamics, Aesthetics) model by Hunicke et al. (2004), which is explicitly outlined in Table 2.

Component	Design counterpart	Social Privilege Simulation Game
Mechanics	Rules	• To have Unbiased/unjudged reflection, we decided for a single player game • To have a community reflection, we decided for a group debriefing • To overcome the need time to reflect, we opted for multiple steps • To have variegate reflections, we decided to have alternance of multiple-choice questions and open reflections
Dynamics	Systems	• Wanted: empathetic perspective and reflections so Dynamic: focusing on characters emotions and perceptions • Wanted: critical thinking so Dynamic: observation and analysis on unequal situations
Aesthetics	Fun	• Engaging and fantasy storytelling • Different way and moment of reflection and to express thoughts and feelings • Revelation afterwords

Table 2: The MDA framework by Hunicke et al. (2004) applied to
the Social Privilege Simulation Game

2.1. Mechanics

In the Mechanics section, we addressed the rules governing the gameplay experience. In order to foster unbiased and unjudged reflection, we intentionally designed the game as a single-player experience. For community reflection, a crucial element of our design, we opted for a group debriefing, ensuring a collaborative and shared experience. Recognizing the challenge of allocating sufficient time for reflection, we strategically incorporated multiple steps within the gameplay. Finally, to enhance a diversity of reflections, we implemented a combination of multiple-choice questions and open-ended reflections, promoting a rich and varied player experience.

2.2. Dynamics

Moving on to the Dynamics aspect of our game, we focused on creating systems that would elicit specific player behaviors and emotions. Our primary objective was to cultivate an empathetic perspective, and to achieve this, we emphasized dynamics that centered on characters' emotions and perceptions. Additionally, we sought to encourage critical thinking by designing dynamics that prompted players to observe and analyze unequal situations within the game environment. By integrating these dynamics, we aimed to create a nuanced and thought-provoking gameplay experience.

2.3 Aesthetics

In the Aesthetics section, we concentrated on ensuring an enjoyable and engaging experience for players. The storytelling aspect of our game was designed to be captivating, embracing elements of fantasy to immerse players in a compelling narrative. We introduced various ways and moments for reflection and expression of thoughts and feelings, contributing to the overall aesthetic appeal. Furthermore, we incorporated a revelation element after the gameplay, adding an extra layer of enjoyment and surprise for players.

Social Privilege Simulation Game

Participants find themselves situated amidst the intricate societal landscape of Privinia, an imaginary world all based around Gritte fruits cultivation and harvesting, where its serenity is currently disrupted by the onset of several social controversies linked to the planet's paramount cultural event: The Gritte Harvest Festival. In this nuanced setting, the participants are entrusted with the pivotal task of delving into the complexities of these emerging issues. Their overarching objective is not merely to witness but to comprehensively analyze the multifaceted aspects of these controversies from a spectrum of perspectives. The resultant analysis aims to furnish a report that will serve as an invaluable resource for the planetary government.

1.   Step 1 - Game Context

1.1. Privinia Planet

On the planet Privinia is divided into three regions—the Windy Lands of the North, the Western Isles, and the Lava Lands of the South; moreover, the convergence of these regions at the orchard area, a supposed common ground, is led by the team that actually wins the Gritte Harvest Festival, a particular celebration that sees the three lands compete to each

other in order to define which one of them will be the head and manager of cultivation ad harvest for the following year. This event is the main reason for the controversies of the past years, ad the planet activities that participants will be askes to analyze and observe.

To understand better the festival's dynamics is important to take a step back and consider the Privinian society, operating under the guise of specific roles determined by lineage: a four-tiered system—Emini, Abem, Alit, and Sabi—exists and define anyone place in the society. Emini, the supposed epitome of industriousness, are tasked with Gritte harvesting, dedicating their lives to the laborious activity. In contrast, Abem, responsible for orchard maintenance, face a structural slowdown, losing at least an hour of their daily time during the Gritte Harvest Festival (Gritte Harvest rules). The introduction of Alit, a subgroup of Abem admired for their attractiveness, further accentuates the disparity as they endure a significant loss of time due to societal expectations and reactions. The recent recognition of Sabi by the Council, those who does not recognize either in Emini or Abem/Alit, only serves to perpetuate the existing issues. Privinu categorically dismiss Sabi as lazy—an arbitrary classification assigned to those who refuse the roles of Abem or Emini. During the festival, Sabi face ostracization, relegated to higher branches to avoid encounters, limiting their harvesting opportunities to a mere two hours a day (Sabi festival constraints).

Regional distributions is also important to understand the Planet and its life. In the Windy Lands, the majority comprises Emini and Abem, with Alit and Sabi relegated to statistical anomalies (Windy distribution: 48% Emini, 48% Abem, 2% Alit, 2% Sabi). The Western Isles, while ostensibly diverse, is marred by a prevalence of Abem and Alit, with Emini and Sabi relegated to mere glimpses of beauty and laziness (Water distribution: 40% Abem, 35% Alit, 15% Emini, 10% Sabi). The Lava Lands of the South, touted as a haven for diversity, only serves to underscore the pervasive inequality—Sabi form a slight majority, while Emini, Abem, and Alit share an almost equal but marginalized presence (Lava distribution: 30% Sabi, 23% Emini, 23% Abem, and 24% Alit).

1.2. The Gritte Harvest

As the Gritte Harvest Festival approaches, the team lineups mirror the differences in societal distribution. The North Winds, a seemingly balanced team, masks the reality with eight Emini and only two Abem (North Winds lineup: 8 Emini + 2 Abem). West Waters, flaunting an alluring combination of Abem, Alit, and Sabi, further accentuates the pronounced social hierarchy (West Waters lineup: 4 Abem + 4 Alit + 2 Sabi). South Lavas, despite its diverse lineup, mirrors the societal distribution, emphasizing the prevalent differences (South Lavas lineup: 4 Sabi + 2 Emini + 2 Abem + 2 Alit).

With all these information, the objective of the game, therefore, is not merely to observe but to immerse oneself in the stark realities of the presented society, navigating the intricate web of social dynamics to bring to light the underlying issues that define life on Planet Privinia.

2.   Game Activities

Once the participant is presented with the context and has time and opportunity to analyze it thoroughly, the practical part of the simulation activity begins. As previously mentioned, this part is mainly divided into two moments, aimed to help participants in writing a meticulous report.

2.1. Step 2 - Empathy

Thus begins the first phase of interactions, which consists of an initial analysis. The participant is presented with data collected from a preliminary survey conducted across the entire population of Privina regarding the Festival. What emerges is a general discontent due to the constant victories of the North Winds over the centuries, not attributed to superior abilities but rather to the absence of barriers or operational limitations. In addition, comes out a significant frustration among certain, more " slowdowned" categories, unable to contribute effectively due to operational barriers imposed by social structures. Based on this, the participant is tasked with asking questions to a sample of targets, drawn from all categories of Privina and from every area of the planet. In this phase, the participant can choose from a set of questions, all focused on delving into the thoughts and feelings of the various interviewees. In this initial stage, the participant is encouraged to try to empathize with the characters through an analysis that goes from general to specific, almost like solving a mystery, to get to the heart of the matter.

2.2. Step 3- Critical Thinking

Once the investigation phase is complete, in order to finalize the report, the participant is asked to analyze some events that frequently occur during the festival. To do this, the player is presented with a typical situation and must answer specific questions that delve into:
- The impacts the event has on the various teams' chances of winning.
- The impacts the event has on individual players of each team in terms of participation in the harvest.
- Whether and which categories are limited or advantaged by the event.

On these three themes, the participant is presented with the following events:
1. A tornado, which uniformly interrupts collective harvesting efforts for everyone. However, this event, upon the resumption of harvesting, requires additional effort from some team members for maintenance and cleaning of the harvesting spaces. These two moments must be analyzed by the participant according to the points listed above.
2. At a certain stage of harvesting, a group, typically that of the North Winds (the favorites), completes their orchard area early and extends harvesting to other regions, introducing a dynamic that influences the tournament outcome and overall chances of winning. This is a very particular event because, once the participant's analysis is complete, unexpected feedback is provided: in past events, the team members that crossed boundaries experienced significant fatigue and discomfort, highlighting a negative impact on work capacity, even severe.
3. Towards the end of the festival, there is often the opportunity to introduce alliances. Typically, the last team can choose one of the teams to ally with. Here, the analysis requested from the participant is twofold: first, the impact of an alliance with the favorites is analyzed, and then with the other team. The aim in this case is to engage the participant in more complex considerations of impact not only on victory but also on the well-being and social capacity of the various team members.

2.3. General Reflection and Debriefing

At the end of these activities, participants are offered a moment of independent reflection on the dynamics of the game, which will serve as the basis for the first phase of collective

debriefing. The game dynamics aim to emphasize a specific concept: it is not necessarily the most skilled team that prevails, but rather the one that has fielded a team less disadvantaged by dominant social structures. These conclusions opens a spectrum of reflection for the participant, potentially prompting them to ask rudimentary questions about the concept of privilege: Is victory linked not to abilities but to the system of rules? Are there events that impact everyone in the same way? And events that impact differently are based on one's condition?

3.   Parallelism: What if Privinia is not just an imaginary society?

Closed the analysis phase of the game and its initial debriefing, it's time for the participant to discover the parallelism with reality. Also, for the discovery of information in the revelation, a mechanic in the form of an investigation is proposed to the participant: some statistics and sentences are presented, and participants try to guess the most realistic ones. Once the quest is completed, participants are prompted with the following reflections:

3.1. Emini

Within the framework of the hypothetical society of Privinu translated into our societal context, the revelations regarding Emini, analogous to white cisgender heterosexual Italian males, expose the complexities of workplace dynamics. These individuals confront positive discrimination but also contend with gender biases in hiring, wage disparities, and limited promotional opportunities. Traditional societal expectations press men to assume primary financial roles, contributing to stress and financial burdens. Moreover, the stereotype enforcing stoicism and the taboo surrounding mental health discourage men from seeking support, potentially leading to higher rates of male suicide (de Beauvoir, 1949; Volpato, 2013; Gasparrini, 2020).

3.2. Abem

The Abem, corresponding to white cisgender heterosexual Italian women, embody the historical burden placed on women concerning domestic responsibilities. This disproportionate burden, including cleaning and caregiving, constrains women's pursuit of careers and professional development. Gender stereotypes and biases affect workplace perceptions, with women facing challenges in promotions and career advancements due to assumed caregiving responsibilities. The unequal distribution of domestic duties perpetuates the gender pay gap, forcing women to make career sacrifices to meet familial caregiving needs (de Beauvoir, 1949; Volpato, 2013; Gasparrini, 2020).

3.3. Alit

The Alit, representative of black women, navigate a unique intersection of gender and racial discrimination. They encounter challenges related to traditional gender roles and expectations, compounded by racial stereotypes and biases. The intersectionality intensifies caregiving expectations and exposes black women to sexualization and objectification stereotypes. Media representations and societal attitudes contribute to these harmful stereotypes, impacting their self-esteem, mental health, well-being, and professional opportunities (Crenshaw, 1989; Curti, 2007; Pepicelli, 2017).

3.4. Sabi

Sabi, analogous to non-binary individuals, face discrimination and stigmatization based on their gender identity. This manifests as bias, harassment, or microaggressions, fostering a hostile environment. Concerns about mistreatment or job loss may lead some to conceal their gender identity in the workplace. Limited legal protections exacerbate challenges, making it difficult for non-binary individuals to seek remedies for discrimination. The stress and anxiety resulting from concealing their gender identity negatively impact mental and emotional well-being, fostering a sense of isolation and invisibility (Cancela et al., 2020).

3.5. General Reflection and Debriefing

As anticipated in the "game design" paragraph, at the end of this moment of revealing the game's intentions and its underlying theme, participants are reintroduced to the debriefing activity. This time, the focus is no longer on reasoning about the game itself but is concentrated on the new perspective offered. This moment serves even more to give space to the participants' growth and self-awareness journey. Having first experienced privilege in a simulated environment and then concretized its concept in everyday life, participants now have the opportunity to reflect deeply on the theme and consider questions of change: Am I aware of my privileges? Have I experienced situations of privilege? And non-privilege? Can I recognize it in the social mechanisms around me? These, along with many other similar questions, can be both reflections suggested by the trainer and emerging stimuli that each participant can take away after completing the simulation experience.

Conclusions

This research was undertaken with the primary objective of crafting an interactive learning experience dedicated to disseminating awareness and understanding of the intricate concept of social privilege. The resultant educational program, initially tailored for managers and subsequently extended to business and management students as aspiring future leaders, is strategically designed to influence participants' soft skills. This encompasses the elevation of listening potential, fostering empathetic behavior and leadership qualities, and strengthening critical thinking abilities, particularly in the context of decision-making processes. Beyond honing soft skills, the program also aims to instill a heightened sense of participant awareness. This involves promoting personal awareness concerning privilege and related topics, enhancing understanding of diversities within the workforce, and inspiring positive actions in response to newfound awareness of privilege-related matters.

In broader terms, the game aspires to contribute to the overarching goals of the Sustainable Development Goals (SDGs) of the Agenda 2030. Specifically, it seeks to align with Goal 5, championing gender equality as a symbol of profound societal transformation. Simultaneously, it actively participates in the pursuit of Goal 10, echoing a commitment to fostering an inclusive and equitable educational environment by reducing inequalities.

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Sexual and Reproductive Health Education to Attain Inclusive Education in Indonesia

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Abstract

Education about Sexual and Reproductive Health and Rights (SRHR) needs to be implemented in inclusive education to establish social justice. SRHR is everyone's right because it is tightly related to success of human empowerment. The Indonesian Ministry of Education and Culture has issued guidelines for Sexual and Reproductive Health and Right program to implement inclusive education. The legal basis for SRHR education has been regulated in Health Law Number 36 of 2009. However, SRHR education has not been implemented optimally in the inclusive education policy. The problems include the amount of sexual violence that occurs in formal schools, pregnancies outside of marriage, and the high number of early marriages among students. Sexual and Reproductive health knowledge is essential for male and female students. This article aims to survey the extent to which inclusive education in Indonesia contributes to sexual and reproductive health issues based on the Salamanca education perspective and principles. This study employs a systematic literature review through UNESCO inclusive education guidelines, SRHR Education, and various cases of sexual violence among students in Indonesia. The results indicate that the implementation of inclusive education in Indonesia is not optimal because it does not prioritize SRHR education as a major priority to prevent sexual violence and pregnancy outside of marriage among students. As a result, students are vulnerable to sexual violence cases because they do not understand the importance of sexual and reproductive health in their bodies. The implementation of SRHR in schools is expected to build social justice in more comprehensive and gender perspective inclusive in Indonesia.

Keywords: Inclusive Education, Sexual Violence, SRHR

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Introduction

Sexual and reproductive health education (HKSR) is a crucial element in building social welfare and justice, especially from a gender equality perspective. However, sexual, and reproductive health education in Indonesia has not been implemented properly. There are many phenomena of sexual violence against teenagers and children and even disabilities, early marriage, and unwanted pregnancies that occur in Indonesia. Sex education and sexuality discussion are still considered taboo and can encourage teenagers to have sexual relations (Miswanto, 2019).

In terms of the gender gap and problems of gender-based violence that occur in Indonesia, phenomena such as early marriage, sexual violence, and others lead women to be the most vulnerable group. Women and groups with disabilities, including children, are vulnerable groups in sexual and reproductive relations. Therefore, sexual and reproductive health education must be integrated into inclusive education in order to realize social justice projects. Sexual violence, child marriage, and sexual coercion are violations of human rights (Amporfu et al., 2020) showing that sexual and reproductive education is also a human matter.

According to UNICEF, Indonesia is one of the eight countries in the world with a high number of early marriages. By the end of 2022, the cases of early marriage in Indonesia reached 1.5 million cases. In this case, the number of married women under the age of 16 is more dominant than that of men. One out of nine women get married under the age of 18 and One out of 100 men marry under the age of 18. UNICEF also has released data that there are 1,220,900 girls who were married before the age of 18 (unicef.org, 2020).

Mostly, early marriages are triggered by pregnancies outside of marriage. Based on data from the Indonesian government, it is found that the majority of those who marry early because they are pregnant out of wedlock (unwanted pregnancy). Hence, applications for marriage dispensation for children under 18 years of age are also high. Marriage at an early age will affect women's physical, psychological, economic, and social health which has an impact on women's welfare. The physical and psychological unpreparedness of children will make women even more vulnerable to their bodies as well as in their families. Moreover, Indonesia's spending on health services remains low and below average compared to other middle-income countries (Bennett & Dewi, 2021). On the other hand, marriage at an early age also hinders children from accessing education and other economic resources.

In other cases, sexual violence in Indonesia is also high. According to the report published by the Ministry of Women and Child Protection in January 2023 (SIMFONI-PPA), sexual violence reached 24,271 cases. Most of victims are women who aged 13-17 years, 80%. Also, women with disabilities are vulnerable to becoming victims of violence. The National Commission on Violence Against Women recorded that there were 57 cases of sexual violence against women with disabilities in 2019. Women have special needs in sexual and reproductive organs because they are highly vulnerable to health risks (Khadijah & Palifiana, 2022).

The increasing number of early marriage cases, sexual violence, and unwanted pregnancies that harm one party need to be analysed critically. What is the role of our education system in overcoming such problems? How does sexual and reproductive education take place in Indonesia and become part of inclusive education? As inclusive education, it needs to accommodate various injustice problems including substantial issues such as SRHR. Women as subjects who often experience oppression in sexual relations are a specific group that also

needs to be observed. This is in accordance with the principles of the "Salamanca Statement" which mainstreams all children, especially those with disabilities and vulnerable groups.

Literature Review

Sexual and Reproductive Health Education

Sexual education remains debatable by many parties at the global level. This debate targets the wider political landscape in various countries, including Indonesia. In terms of terminology, sexual education has different definitions in each region. Some countries use the terms sex education, reproductive health education, or comprehensive sexual education (CSE). Discourses regarding sexuality are controversial, especially when discussed in public spaces. Sexuality is often interpreted as taboo, shameful, and should be kept secret, so that it does not need to be taught in formal education. On the other hand, stigmatization and stereotypes regarding sexual education are often considered westernized, tend to be liberal, allow sexual behavior, and still color the educational landscape in Indonesia.

At the global level, sexual education interventions continue to be developed by many parties over time. This includes the involvement of international organizations, such as the World Health Organization (WHO), the United Nations Educational, Scientific and Cultural Organization (UNESCO), social institutions, communities and the world community which are involved in implementing sexual education. This effort tries to touch issues of sexuality at the grassroots. Ine (2016) explained that sexual education which is comprehensively implemented in schools, is considered capable of providing knowledge to the community. This includes answering questions about the anatomy and function of reproductive organs, pregnancy, relationships, family roles, sexual diseases, contraception, and so on. Besides, sexual education is regarded a preventive measure to identify and prevent the possibility of sexual harassment among students.

Sexual education for vulnerable groups is exigent. This marks the need for appropriate sexual education to the target condition where sexual education intervention cannot take place by itself. Involvement of various parties including individuals, families, schools, communities, and formal policies underlies the accessibility of sexual education. This framework then allows the important consideration whether sexual education will stand alone or be integrated into the school curriculum (Robinson et al., 2019). Comprehensive sexuality education is a cost-effective way to put students on a path to healthy decision-making and away from risky or ill-informed sexual and reproductive choices. When teaching is inclusive and promotes equality and respect for all people, society and the whole world will benefit.

The positive impact of comprehensive sexuality education is real once it is implemented properly in educational institutions. According to UNESCO, sexuality education programs might contribute to delayed initiation of sex, fewer sexual partners, less frequent unprotected sex, increased use of protection, especially condoms, reduction of risky sexual behavior.

Comprehensive Sexuality Education (CSE) is a program which provides information about sexuality and sexual health based on the age of the young generation. CSE plays a very important role in the health and survival of this generation. CSE is based on an established curriculum that is scientifically accurate, age-relevant, and comprehensive in covering the topics of life skills, family life education, consent and bodily autonomy, puberty and menstruation, contraception and pregnancy, sexually transmitted infections, or HIV. Sexual

education provides children and adolescents with knowledge and skills in terms of values to protect personal health, develop respectful social and sexual relationships, and foster a sense of responsibility and understanding of others' right.

Inclusive Education

Inclusive education is a concept that has emerged as a contradiction in fighting inequality in every country in the world. This term has been popular since the Salamanca statement in 1994, which was signed by 92 member countries. In this case, education or schools with an inclusive orientation are considered the most effective way by creating a supportive environment for all students (McLeskey & Waldron, 2000), and appreciating students' creativity and shortcomings without any discriminatory elements (Clough & Corbett, 2000; Allan, 2007). Since then, the term inclusion has been widely studied with various definitions used by different authors.

Opertti, Walker dan Zhang (2013) stated that there are four primary ideas internationally which are relevant to inclusive education, including: First, inclusion is always related to human rights. Second, inclusion is also oriented towards children with special needs. Third, inclusion must embody and embrace marginalized groups. Fourth, inclusion can also act as a basis for transforming the education system. This idea was developed on the basis that educational equality has not been maximized between urban and rural areas in many countries. Therefore, it can be emphasized that the crucial problem for education is the low level of inclusiveness and learning opportunities for students with special needs and other marginalized groups.

Another review that has become an international standard trend in interpreting inclusive education is the ideas of Ainscow et al. (2006) dan Azorín & Ainscow (2020). They suggest ways of thinking about inclusion including: 1) inclusion is related to disability and the need for special education which is seen as the most common approach to the inclusive education concept, 2) inclusion as a response to disciplinary exclusion which means that inclusion is associated with students who have challenging behavior and are different from students in general, and 3) inclusion includes all groups that range from attitudes of social exclusion in society.

Moreover, the fourth (4) is inclusion as the promotion of schools for all. This approach is related to the term of a comprehensive school which is the school development by emphasizing the appreciation of innovation and creativity of each student. 5) Inclusion, as education for all people or students, refers to UNESCO's "Education for All" agenda focusing on increasing access and participation in education both nationally and internationally by setting certain goals that contribute to the progress of each country. 6) Inclusion, as a principled approach to education and society, has implications for inclusive values such as equality, participation, community, and respect for diversity, which are seen as important in guiding policies and practices to improve education and knowledge as a whole.

Therefore, according to these previous definitions, it can be concluded that the conceptualization of inclusive education is understood in different ways or adapt to the context of problems in each region. The main point of inclusive education is the desire to introduce attitudes and behavior to students, teachers, and parents to provide equal rights without looking at the shortcomings or social status of the students involved. On the other hand, inclusive education which prioritizes educational transformation also emphasizes the introduction of knowledge that is vulnerable to issues of gender, marginalization, and discrimination. It means that it has the potential to provide guidance for students and partners to be more vulnerable to

social problems (gender-based violence and social class) indirectly that often occurs in the surrounding.

Methodology

This research employs a literature review analysis. The type of literature review used refers to SLR (Systematic Literature Review). Calderón & Ruiz (2015) define the systematic literature review method as an approach to research that acts as a means of identifying, evaluating, and interpreting all research that will be carried out. The study collection is also selected or adjusted to the most relevant topics, questions, or research formulations to be studied as well as research phenomena that have a major contribution in ideas to the research being carried out.

The systematic review contained in the SLR method is a form of secondary research (Kitchenham & Charters, 2007). Furthermore, Kitchenham et al., (2009) state that the aim of a systematic literature review is to systematically examine library sources through the process of identifying, assessing, and interpreting similar previous research evidence. The research aim using this systematic literature review is to obtain a theoretical basis that can support solving the research problem and reveal relevant theories to the case. More specifically, this study tends to emphasize both national and international cases of inclusive education, as well as regulations declared by the UN or UNESCO in emphasizing the importance of gender-based education, especially on educational and reproductive rights for students and social layers in society.

The use of the SLR method in this research was carried out using the PICOC approach, which represents the scope of SRL. PICOC helps in analyzing literature data and answering research questions. It is also similar to feasibility screening (quality of the results of a literature review search that is in accordance with categories or standardization of research limitations). This approach includes several parts, including: (1) Population (P), representing the population or subjects in the research. The population in this study includes the interoperability of study criteria regarding women, students, teachers, government, NGOs (Non-Governmental Organizations) and the role of parents in initiating the formation of inclusive education that is sensitive to sexual and reproductive health.

(2) Intervention (I) refers to pragmatic interoperability which includes an action carried out by the research subject. In this research, the intervention context was carried out to analyze regulatory policies in responding to social problems regarding violence, rape, pregnancy at a young age and early marriage at a minor or early adulthood. This stage is carried out to determine how much regulation can influence changes in social issues related to the weakness of inclusive education. (3) Comparison (C) is a comparative intervention. In this case, the researcher did not use comparison, because the researcher did not aim to compare the results of a literature review regarding the implementation of regulations or inclusive education policies among countries, but only in Indonesia.

(4) Outcomes (O)refers to how the results of the literature review relate to the research focus, namely the right to inclusive education in understanding sexual and reproductive knowledge from an early age. It means that outcomes refer to articles with similar results to research problems on inclusive education and sexual and reproductive health rights for students and teenagers in the community. (5) Context (C) is oriented towards contestation or research focus based on approaches to implementing national and international regulations on inclusive education in Indonesia.

In the next stage, researchers begin to identify literature from journal articles that is relevant to the topic and research problem. This stage is called the search process. In this case, literature review is defined as a series of search results based on research themes. This literature search was carried out on 14 August 2023 – 10 November 2023, based on secondary data obtained from the website of the journal article being studied. The secondary data was obtained from international journal articles with pre-determined topics and research problems through keywords.

The literature search used a database in the English language search engine "Sage journals". The keywords are also in English. As a limitation for data searches, researchers only select journal articles published in the last 10 years (between 2013 and 2023). Besides, as suggested by research limitations, the selected journal articles focus on sociology and social sciences journals & humanities.

It can be seen that the amount of data obtained was 40 articles based on the results of the latest literature review. These articles were then reviewed and analyzed based on title, abstract and relevant topics, hence it was decided to include 40 articles which were relevant. Then, the researcher implemented a quality assessment model to obtain more comprehensive literature review results. After an in-depth review and analysis of the 40 articles listed, it turns out that only 25 (twenty-five) articles passed QA. Therefore, this research will only discuss 25 related research articles.

Flowchart
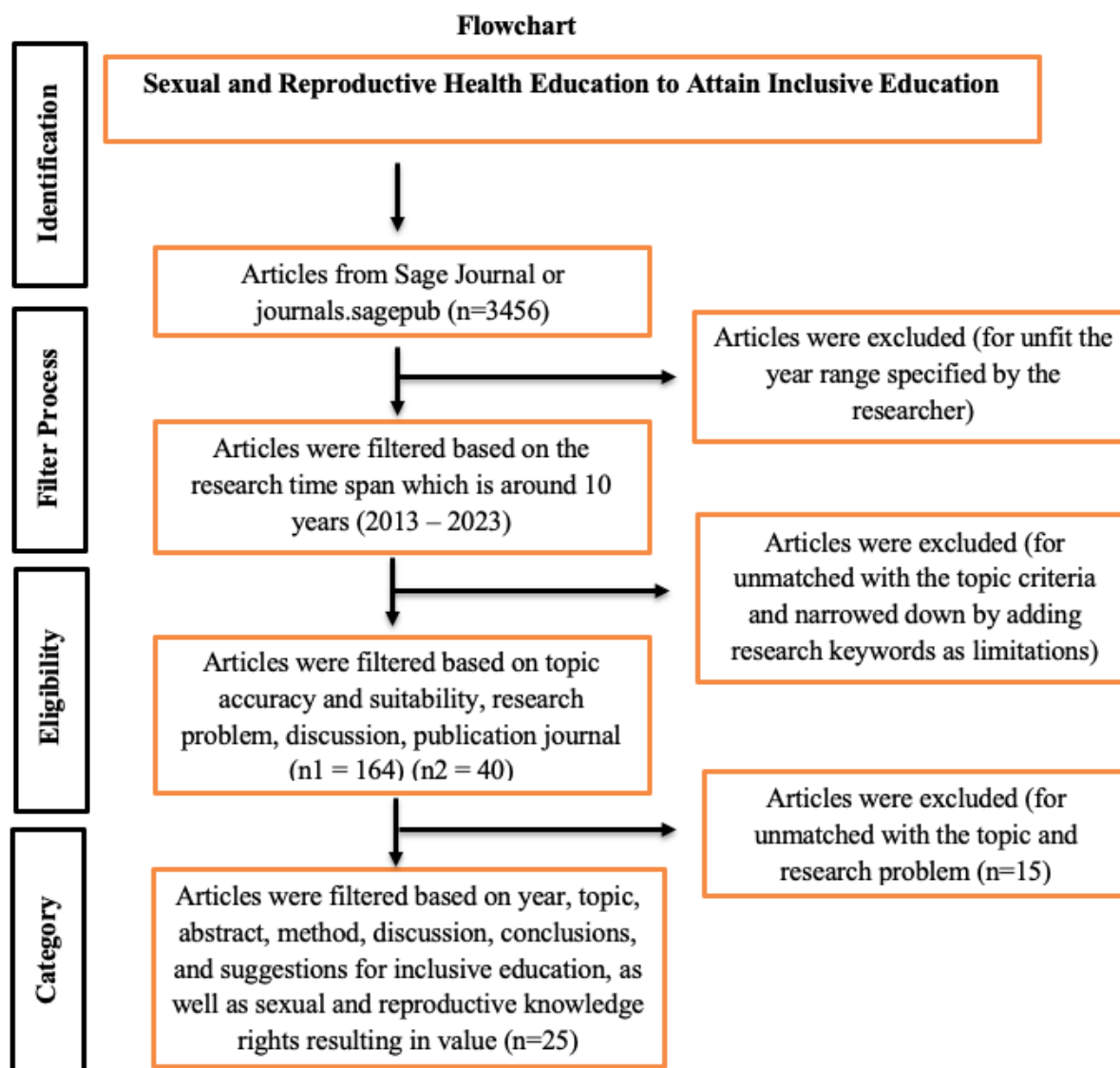
Result Discussion

Sexual and Reproductive Health in Indonesia

Self-awareness is defined as an individual who has concern for maintaining self-function both physiologically, psychologically and in social welfare. One part of this awareness is maintaining the reproductive health system so that individuals have a safe sexual life for themselves. Individuals can plan the number of family members and produce offspring through reproductive health. Therefore, individuals could receive information about contraceptive methods, reproductive health services (delivery, postpartum, antenatal services), and health services for children and adolescents (Harahap, 2003).

Indonesia has a National Sexual and Reproductive Health policy including:
1. Maternal and Child Health Program aims to reduce maternal mortality during childbirth and the postpartum period. Preventive efforts can be carried out by providing antenatal care, labor, or parturition services, and postnatal or postpartum services. In addition, preventive efforts also include providing education regarding sexual relations that can

cause pregnancy. This is done to prevent unwanted pregnancies and reduce the percentage of life-threatening miscarriages (Rahayu et al, 2017);

2. Family Planning (KB) Program focuses on reducing population growth, improving maternal health and family welfare, regulating the spacing and number of births;

3. Adolescent Reproductive Health Program is carried out through education to prevent problems such as free sex, drug abuse and illegal drugs, unwanted pregnancies which lead to abortion, pregnancy and childbirth at a young age which poses a risk to the safety of the mother, and the emergence of sexually transmitted diseases (STDs) and HIV/AIDS infections.

4. Program for Prevention and Treatment of Reproductive Tract Infections (ISR)
Preventive measures to avoid this disease include not having free sex or frequently changing sexual partners, using condoms properly, maintaining personal hygiene, especially the reproductive organs, and carrying out examinations with the relevant health services.

5. Reproductive Health Program for the Elderly
The problems related to reproductive organs are disorders during menopause, cardiovascular disease, joint-pain, prostate cancer, and other degenerative diseases. Proper treatment efforts for reproductive health in old age can improve the well-being of the elderly.

Self-protection might not fully prevent someone from sexual violence. The cooperation from various elements to create a safe-space free of violence for society, especially women is required. Also, formal education plays a pivotal role in providing a safe space for victims of sexual violence. The education system must include learning topics related to human rights. In terms of peace, students are also taught to develop the ability to resolve personal and group conflicts through mediation and negotiation, without using violence. Teacher training to detect violence, including sexual violence in the school environment is also required (Purwanti, 2020).

Inclusive Education in Indonesia

A gender-biased education and a tendency to ignore reproductive health knowledge is one of key factors in education problems in Indonesia and other countries. WHO (World Health Organization) report suggests that various countries in the world are facing various challenges in providing sexual and reproductive health services evenly, increasing maternal and child mortality rates, gender-based violence, and low levels of information or knowledge regarding sexual and reproductive health both inside and outside school (WHO, 2015, 2018). Therefore, the United Nation (UN) participated in declaring a policy program on Sexual and Reproductive Health and Rights (SRHR) as a response to this issue.

SRHR aims to monitor or reaffirm the importance of knowledge about health rights and rights in understanding sexual and reproductive aspects for individual. It means that this SRHR declaration needs to be implemented and adopted by all countries because it is prominent in contributing to the reproductive health success index. In this case, gender and reproduction are also able to determine unique and specific health needs, especially for girls and other adult women. For this reason, Sen & Govender (2015) emphasized that Sexual and Reproductive Rights (SRR) are mandatory rights that all students and adults need to understand and obtain in order to achieve physical and mental well-being.

The integration of SRHR in inclusive education in Indonesia has been carried out through several programs, for example, the BERANI program. The BERANI program stands for Better Sexual and Reproductive Health and Rights for All in Indonesia, which has a vision in line with WHO, UNFPA (UN Reproductive Health Agency – for Women and Girls) and UNICEF (UN International Children's Fund), to combat sexual violence and reproductive problems for women and men (UNFPA Indonesia, 2018).

The right to obtain knowledge about sexual and reproductive health is a key aspect that needs to be disseminated and practiced since at the school age (Glasier et al., 2006; Chandra-Mouli et al., 2019). Moreover, inclusive branding is not only translated definitively to achieve equality. However, inclusive education should encourage the critical abilities of students, parents, and teachers to explore 'what kind of equality is appropriate to implement in order to reduce sexual violence'. A simple analogy of health and reproductive rights for the community (children to adults) needs to be provided, because it brings a huge influence on the quality of one's life as a nation. Specifically, not fulfilling these rights will certainly be an obstacle to women's self-empowerment. This is because it will further perpetuate patriarchal culture which leads to social inequality for men and women.

The government plays a role in supporting gender-based inclusive education at all levels of society in Indonesia indirectly through the BERANI program. This program was initiated in Indonesia due to: First, high maternal mortality is led by the suboptimal quality of reproductive health services. It has been convinced that in 2017, the rise in the proportion of births by medical personnel in Indonesia reached 91%, where this figure represents how high the birth rate is in Indonesia. However, based on this assumption it is reported that there are 305 maternal deaths (women) for every 100,000 births, due to late treatment by existing health workers. Moreover, there are only 50% of midwifery graduates from 700 midwifery schools in Indonesia annually (midwifery is a tertiary institution as the main provider of health and reproductive services for women in Indonesia) (UNFPA Indonesia, 2018).

The second factor is the unmet need for family planning. Mostly, young and old couples in Indonesia still do not fully understand and use proper contraception. As a result, it is undeniable that the birth rate and risk of death in pregnancies among young mothers are also increasing. Based on 2017 data, it was recorded that 10.6% of married women with childbearing age did not use a contraceptive method, even though they consciously did not want to experience a close-pregnancy distance (Irawaty et al., 2020). Meanwhile, in 2018, the death rate reached 12.4%, accompanied by an increase in the drop-out rate of 28.9%. This means that poor understanding in the use of contraceptives poses a high risk to the reproductive health of married couples, especially teenagers.

Third, teenage pregnancies in Indonesia (before marriage) are increasing. The key factor of teenage pregnancy, especially for those who are still in school (as students), is more likely led by poor access to accurate sexual and reproductive health information and services from schools and local health services. The challenge in accessing reproductive health and knowledge is also caused by several (unwritten) norms in society, which assume that providing reproductive knowledge to students is taboo. On the other hand, existing services have not yet comprehensively fulfilled young people's needs. Moreover, health and reproductive education remains not a mandatory subject in the national school curriculum. Thus, it is important to note that existing educational regulatory guidelines and resources have not met teachers' need to provide the knowledge and skills required by students.

The fourth factor is the high level of gender-based violence and harmful practices against women and girls. This problem occurs in both urban and rural areas where women and girls are the subjects of discrimination by the patriarchal culture. Therefore, violence and sexual harassment are unavoidable. According to the 2016 National Women's Life Experience Survey, it was recorded that one out of three women aged 15-64 years reported frequently experiencing physical or sexual violence (UNFPA Indonesia, 2018). Meanwhile, the group of girls aged 15-19 was reported experiencing the highest level of violence in Indonesia. The high prevalence of child marriage also drives domestic violence among girls under the age of 25. It was recorded that in 2018, one out of nine girls aged 20-24 years married before the age of 18 years. Thus, based on all of the above reproductive health problems, the government should reaffirm these rights through inclusive education in Indonesia.

Sexual and Reproductive Health Education to Attain Inclusive Education in Indonesia

Inclusive education accommodates all children to achieve equal and sustainable education. It means that inclusive education needs to highlight issues of women's vulnerability in social relations, especially in sexual relations, including women with disabilities who are also vulnerable to be victims of violence. Thus, a country has an obligation to protect and fulfil children's educational rights, including children's rights to sexual and reproductive education through inclusive education. This is pivotal to reduce the rate of early marriage, sexual violence, and unwanted pregnancies.

Sexual and reproductive health education is a comprehensive education that teaches about menstrual health, pregnancy, safe abortion, gender-based violence, infectious diseases, dangerous acts, and sexual diversity. Generally, this will cover gender education, reproductive health, human rights, violence, diversity, relationships, and others. Sexual health education in Indonesia remains limited because it is unavailable in schools (Utomo & McDonald, 2009). Meanwhile, sexual, and reproductive health education is expected to be implemented properly in inclusive education in Indonesia because every child and adolescent has the right to sexual and reproductive health which can be achieved through education.

Lack of sexual and reproductive education that occur in developing countries such as Indonesia are led by several factors such as customs, culture, religion, and limited knowledge from the right sources (Nehioshon et al., 2021). One limitation of this right source is educational institutions. After all, educational institutions in a region do not exist by itself but are also influenced by how local culture develops. Finally, there are still limitations, even in educational institutions, in providing understanding about sexual and reproductive health because it is still considered taboo and an inappropriate discussion for children and adolescents culturally.

This means that inclusive education in Indonesia is not fully in line with the shared principles of equality and justice. The justice values are reduced by the environment and adapt to societal stigma, especially in developing countries. Therefore, inclusive education needs a self-reconstruction in accordance with the principles of the Salamanca statement which creates equality and justice for others. In the Salamanca principle, education is expected to adapt to children's needs with different needs and abilities (UNESCO, 1994). Currently, sexual, and reproductive health education is crucial for every child and adolescent which should be included as a key element in learning.

Thus far, reproductive health education in Indonesia has only been one of contents in Biology which explains regarding reproductive organs, the pregnancy process, venereal disease, and

other health-related issues without involving affective aspects. Sexual and reproductive health does not extend to psychomotor education which embed skills and behavioural values in children regarding sexual behaviour. They include educating children to avoid the threat of sexual violence, knowing the vital organs that other people should not touch, teaching about safe and unsafe touch, and educating about how to build healthy relationships and access services for sexual health and reproduction. Up to now, young people in Indonesia have limitations and find it difficult to access sexual and reproductive health services (PPN/Bappenas et al., n.d.).

Sexual and reproductive health education in inclusive education provides knowledge about rights to guarantee and teaches every individual to make decisions regarding children's sexual and reproductive activities without discrimination, coercion, and violence, including access to services. Thus, there is no gap in knowledge even in access to services. Education should have high sensitivity to children's needs in accordance with inclusive education in the Salamanca principles. Sexual and reproductive health education that should be implemented in Indonesia needs national level support, starting from policies and organizations, educational institutions, recruitment and training of educational personnel, external service support, priority areas, community perspectives, and resource requirements (UNESCO, 1994). It means that educational sensitivity to the diversity of children's needs can be formed by developing non-discriminatory behaviour, building open and inclusive communities and societies, so that education can be achieved by every child/individual.

Salamanca principles can also be applied in sexual and reproductive health education such as how every child can receive reproductive health education, whether male, female, or disabled. Besides, it can be how does the education system and state build an external environment that supports well-implemented sexual and reproductive health education. A sustainable organization that advocates for sexual and reproductive health issues, adequate service infrastructure for sexual and reproductive health, and educational institutions that are aware of sexual and reproductive health rights are also required.

Conclusion

Sexual and reproductive health education should be included in an inclusive education curriculum which is adaptive to all educational institutions. This is an effort to equalize sexual and reproductive education so that there are no social disparities between regions and between genders. Sexual and reproductive health education requires strengthening organizations, communities, parents, and infrastructure according to the principles and framework of the Salamanca Statement. Some of them are carried out without gender bias and are inclusive of children and teenagers, including children with special needs who are also vulnerable to experiencing gender-based and sexual violence.

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The Online Training to Create an Online Society That Connects Tourism for Employment and Preparation for Future Work

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Official Conference Proceedings

Abstract

This research aims to: 1. construct an online training system to convey knowledge and the production process of tourist media to communities and people during the coronavirus disease 2019 (COVID-19) pandemic; and 2. examine people's access to online training systems. Examine the performance of the online trainees. The findings demonstrated that: 1. The developed online training system is of high quality. There are both media and self-evaluations. It may be used as a learning center and for self-development by trainees. During the COVID-19 epidemic, participants were given three months of online training. 1348 individuals have participated in the program, and 267 individuals who have passed the course may submit their work to get certificates. The outcomes of the online trainees who have been taught during the duration of the project are capable of producing video media. The objective is to expose the community to its own attractions at the highest level possible.

Keywords: Online Training, Online Society, During the COVID-19 Pandemic, Future Work, Upskills, Reskill, New Skill

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Introduction

The tourist industry is one of the most significant industries in Thailand's economy, generating more foreign currency than other exports. Consider that the tourist industry contributes to the growth of the nation; provides jobs; distributes revenue; circulates currency in the economy; and enhances the country's image. This study has been deemed the nation's soft power. This initiative has been financed by the government. Developing the nation's personnel skills (reskilling, upskilling, and new skills) to secure employment and prepare for future employment. After the 2019 coronavirus epidemic.

This initiative has been financed by the government of Thailand to develop the nation's personnel skills reskilling, upskilling, and new skills to secure employment and prepare for future employment. After the 2019 coronavirus pandemic. Traveling is the human activities that make happiness. Traveling creates a relaxing environment in addition to having fun. It lifts our spirits, brings us joy, and facilitates our escape from life's stressors (Gilbert & Abdullah, 2002). According to psychology, travel enhances brain function and efficiency. It facilitates better thought processes and can strengthen interpersonal bonds. can also be improved upon. Traveling is a new industry activity that employ different elements of production are referred to as being in the tourism industry. Come develop one tourism service that brings comfort or happiness, then market such services to visitors. 1. The product is intangible. 2. The product is stationary and doesn't move toward the customer. 3. The product is non-degradable. 4. The product may or might not undergo a change of ownership (Preecha Treesuwan 2014). The impact of COVID-19 global travel. This effect was significant and continued for many years throughout Asia. The important thing is the ability of the next generation of individuals to improve themselves by reskilling, upskilling, new skills providing education at learning establishments Part of it can only be completed. Most people in society are not able to access. Due to the demanding and laborious course challenging to alter. Workers make up the workforce. Unable to acquire knowledge. A long way from schools Not enough time to work Inappropriate technique of instruction Providing education at learning establishments Part of it can only be completed. Most people in society are not able to access Due to the demanding and laborious course challenging to alter. Workers make up the workforce. Unable to acquire knowledge. A long way from schools Not enough time to work Inappropriate technique of instruction.

To train working people or people in the labor market who are working it is very important to adapt media training methods to suit the work being done. Therefore, the researcher, who is a media and technology teacher, introduced the concept of the designing process (Brown T, Wyatt T 2010), which is a process for developing work starting with creating something new step by step. To be used as a training process for the nation's workforce to further develop their own tourist attraction information.

Population and Sample

Population

There were 1348 people who applied to join the project. Self-employed people affected: 2. Laborers in the system who were laid off or returned 3. Labor in the system lacks skills and tends to decline. 4. Labor in the system that is currently valuable but needs upskilling or reskilling 5. Manpower to enter the labor system.

Sample Group

Those who have studied successfully and submitted a complete work number and people who passed the course: 267.

Methodology

1. Construct an online training system to convey knowledge and the production process of tourist media to communities and people during the coronavirus disease of 2019 (COVID-19) pandemic.
2. Study the results of using the online training system.

Results

1. Create an online training system to transfer knowledge and processes for producing tourism media to communities and citizens during the coronavirus disease 2019 (Covid-19) pandemic. In this training Has used a training process Designing which has a process There are five steps. And to suit this, the participants will have to produce media using a three-step process. The researcher therefore adjusted the process to be the three steps in media production are pre-production, production, and post-production. The steps are as shown in the picture.
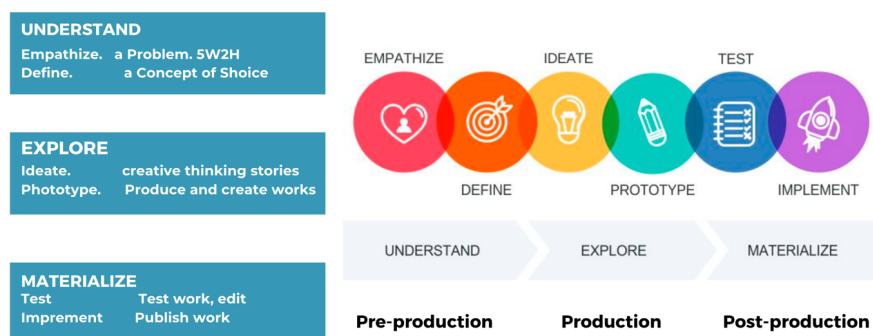
Design Thinking Process

Figure 1: The training process using the Design Thinking process
and tailored to a three-step production process.
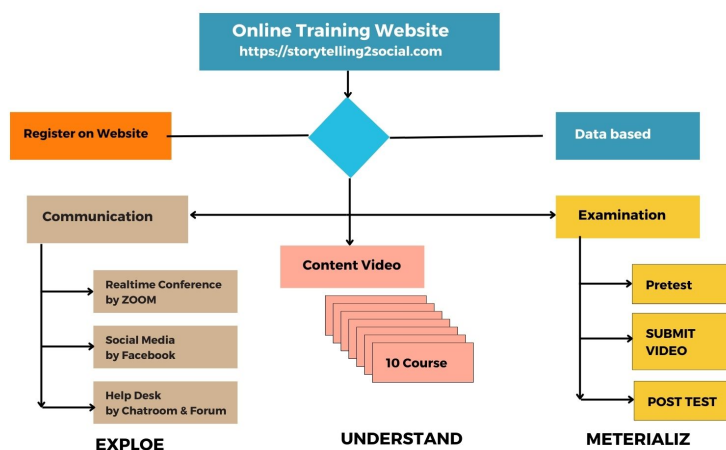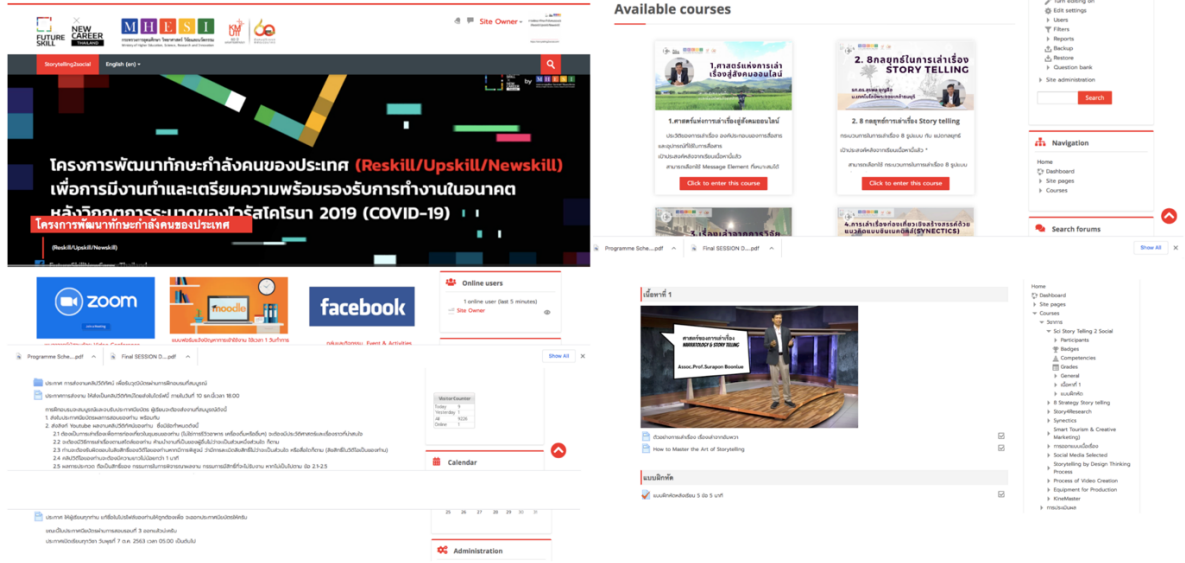

Figure 2: The components and media of the training website
using the Design Thinking process.

Figure 3: Image showing an example of media used in training
using the Design Thinking process.

2. Study the Results of Using the Online Training System

2.1 Number of visitors on the website shows how often the system is accessed in training and the percentage of website traffic of trainees.

Table 1. Number of visitors on the website

Trainee coming to study	Number of times coming to study	Number of pages viewed.
1348	3935	12746
	34 %	10.57 %

From Table 1 it shows that All users had 3925 visits and 1348 new users accessed 12746 pages from the website. When you click the link, you will have immediate access to most of them. and comes in second place with referrals from social networks. And it was found that most patients returned to study.

2.2 Age Level of Trainees and Classify Percentages According to Age Range

Table 2. Age level of trainees

No.	users.	There have been
1	18-24	29 %
2	25-34	27 %
3	35-44	19 %
4	45-54	11 %
5	55-64	8 %
6	65	5 %

From Table 2 it shows that Age level of trainee. The bulk of trainees are between the following ages: The first age group is 18–24. Ages 25 to 34 come in second. Ages 35 to 44 come in third. and fourth, people over 65 made up the least number. Most of the trainees are women. 60.6% female and 39.4% male, which, if one were a university professor The possibility to pursuing higher education will not be available to those in the second, third, or fourth categories. demonstrates the ability of online training systems to reach skill-development groups really.

2.3 Trainee Who Came to Study and Submitted Work Until the Project Was Completed

Table 3. Trainee who came to study and submitted work until the project was completed.

Number of Trainee coming to study	Number of Trainee who submitted work to complete	Number of %
1348	267	19.8

Table 3 shows that of the 1348 trainees, 267 people submitted work to complete the project, accounting for 19.8%.

Summary and Discussion of the Results

Training results, summary, and discussion of results from the development of online learning resources. on social networks or LMS systems so that everyone can come and study There were many people attending the training and from every region. of the country. Training in this way makes it possible to provide training in large quantities with the following objectives: Creating an online training deposit system It uses LMS features that make it accessible from any device. and can come to study from anywhere every time, making training possible.

The training process uses the Design Thinking in training process. This can be applied to all three steps of the process of producing media to promote one's own tourist attractions. It

starts with understanding local issues or problems, which is the production planning process. 2 processes for exploring, which are the production processes. Going out to film video clips and 3 processes in materiel That is, the post-production process involves checking the work and further presenting it in social networks.

Transferring knowledge and processes in producing tourism media to the community by allowing students and staff to be representatives of the community Most trainees are trained in the field of knowledge. Many test takers passed and received high scores. But the work produced by trainee's accounts for nearly half of the work submitted by the students until completion. This may be because the trainees may not have time due to Most of the trainees are students and may be close to exams. But the work submitted from the evaluation shows that the process of telling stories follows the principles of storytelling that have been trained and has creative ideas in finding strategies for telling stories in an interesting way.

Faculty members who join as lecturers can exchange knowledge with the community and trainees In a conversation, coordinate the time using the Zoom video conference system, resulting in information and stories about the community where the trainees live.

Strengthening the community in developing local tourist attractions from training this time It is believed that the trainees received knowledge. creativity and the ability to video media production Travel can be published on social networks.

Conclusion

From the results and information All that has been presented It shows that this online training is the training achieved the objectives it had set out very well, but there were some problems and obstacles, such as the trainee's internet system being insufficient because it was learning from video clips, making it difficult to used. The amount of information is large, and there should be a cost or compensation for the trainees to help alleviate the burden. and it is persuasive. Come to study until training is completed. Activities used in training include self-study. There is no group participation, which makes some students feel bored when they finish studying or have studied for a while. Field activities (workshops) should also be organized to ensure the continuity of training.

In this training, there are the work and training organizers would like to thank you. Human resource development project of the country (reskill, upskill, or new skills) to have work and prepare for work in the future. After the outbreak of the coronavirus 2019 (COVID-19), the budget was allocated to fund management. Training gives knowledge and benefits in every sector. trainees, lecturers, organizers, and universities who have had the opportunity to publish their work or participate in community development together.

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A Comparison of High School English Textbooks in Japan, Korea, and China: Do the Differences Significantly Affect the Outcomes?

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Abstract

English education in Japan, Korea, and China may display certain similarities, since they are all fundamentally monolingual societies, where citizens may not have much need for English on a day-to-day basis. They are all now keen to take advantage of the opportunities of globalization and recognize the importance of English in this context. In all three countries, the English education system has recently moved towards more communicative approaches, with Korea perhaps originally leading the way in this (Yuasa, 2010). Japan still tends to rank lower on international measures for its citizens' English skills than China or Korea (So, 2019), despite promoting English language classes in primary schools since 2011. In China and Korea, compulsory English lessons begin in the 3rd grade of primary school, but not until fifth grade in Japan (as a fully-assessed academic subject, although "English Activities" classes begin in third grade since 2020). Textbooks and other learning materials play a significant role in school education, and their capacity to stimulate and motivate learners is especially crucial at the high school stage when students are reluctant to risk losing face in potentially embarrassing communication activities. So, if other conditions are similar, it seems possible that these materials may differ in some important way(s). This is the focus of our study, comparing typical high school textbooks from the three countries from the aspects of volume of English words used and sentences per book and per chapter, and the amount of visual illustration of all kinds relative to written text.

Keywords: English Textbooks, Proficiency, Country Comparisons, Exposure, Emphasis

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Introduction

English education in Japan, Korea, and China may display certain similarities, since they are all fundamentally monolingual societies, where many ordinary citizens may not have much need for English on a day-to-day basis. They all use non-alphabetic writing systems (although there are significant differences between them, which will be mentioned later in this paper). All three countries are now keen to take advantage of the opportunities of globalization, particularly in the areas of business and education, and recognize the importance of English in this context. In all three, the English education system has recently moved towards more communicative approaches (Kwon, 2009; Liu, 2009: Yamaoka, 2009) with Korea perhaps originally leading the way in this (Yuasa, 2010). Japan still tends to rank lower on international measures for its people's English skills than China or Korea (So, 2019), despite promoting English language classes in primary schools since 2011. Today, compulsory English lessons begin in the 3rd grade of primary school in China and Korea, but not until fifth grade in Japan (as a fully-assessed academic subject, although "English Activities" classes have begun in third grade since 2020).

Textbooks and other learning materials play a significant role in school education, and their capacity to stimulate and motivate learners is especially crucial at the high school stage when students are reluctant to risk losing face in potentially embarrassing communication activities. The materials' content can be an important source of information about the target language speakers and their cultures (Liu, 2009; Igarashi, 2022; Igarashi, 2023), and this is a key feature to appeal to young people learning English in a foreign language classroom, particularly where not all students have easy access to electronic devices and internet resources, or the inclination to make use of them to further their own learning (see Mao, 2020, on differences between urban and rural students' use possession and use of technology).

China has, undoubtedly, struggled most to overcome disparities in educational resources and achievement, owing to its huge geographical area, but much progress has been made since 1986, when the Compulsory Education Law was promulgated (China.org, n. d.). So, if other conditions are similar, it seems possible that these materials may differ in some important way(s). This is the focus of our study, comparing typical high school textbooks from the three countries from the aspects of volume of English words used per book chapter, number of sentences per page and per chapter, amount of visual illustration of all kinds relative to written text, and any special features that may be relevant.

It should be emphasized here perhaps that this is essentially an exploratory study, which should, hopefully, provide material or direction for further more in-depth research into relevant features.

1. Rationale for the Study

Japan ranked 80th out of 111 countries and regions whose native language is not English on the "English Proficiency Index" compiled by Switzerland-based EF Education First in 2022 (EF EPI, 2022). This placed it in the "Low Proficiency" bracket - "Low" being the second lowest of five groupings based on rank - and Japan's ranking is two places lower than the previous year, although the average score improved from 468 to 475. EF refers to "Japan's steady decline in English proficiency." This seems a little hard on Japan, although the

situation is shown quite dramatically in Fig. 1 below. Furthermore, the EF 2023 rankings indicate a further decline, to 87th out of 113 countries, with a score of only 457.

China, although also in the "Low" category at 62nd in 2022, with a score of 498, ranked 82nd in 2023, with a score of 464, and South Korea at 36th (score 537) in 2022 and 49th in 2023 with 525 (but still in the "Moderate Proficiency" level, according to the EF organization). Both continue to outperform Japan.
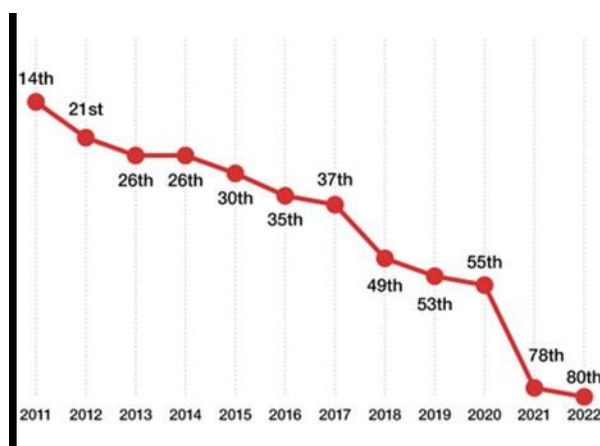

Figure 1: Japan's EF English Proficiency Ranking (Source: Nippon.com)

The Netherlands took the top spot in the 2022 rankings (a lead it maintained in 2023), followed by Sweden in second and Norway in third place. Obviously, learners in these countries are in a very different position from students in Asian countries due to linguistic and cultural factors as well as geographical proximity to English-speaking people and environment. In fact, Asia's regional average dropped slightly in 2022 and again this year, although three countries (Sri Lanka, Mongolia, and Kyrgyzstan) improved significantly and two more (Hong Kong and Vietnam) moved into a higher proficiency band in 2022. China and the Philippines were the main drivers of the declining regional score. Japan placed 15th among 23 Asian countries and regions, with South Korea and China in 5th and 14th positions respectively (China was 6th in 2022). Much of the decline in the 2023 rankings can be ascribed to the effects of COVID-19, which have disproportionately impacted the very significant 18-20 year old age band. Study abroad programs were cancelled and motivation severely affected.

While the EF Index does suffer from some shortcomings in terms of its methodology since instead of testing the level of English proficiency in the general population, it tests the level of English of those who self-select (Gazzola & Mazzacani, 2017), we feel that it does provide a measure that allows comparisons to be made. All the major internationally-recognized measures of English proficiency also suffer from the same biases, but provide at least some window on the actual situation, even if we need to be cautious about seeing their figures as representing the whole picture.

As far as basic teaching materials are concerned, in high schools across Japan, the use of government-approved textbooks is mandatory and most of the language input students receive is from these textbooks (Sugiura et al., 2020). This would appear to mirror quite closely the situation in China although in South Korea both prescribed and non-prescribed textbooks seem to be in common use (Song, 2021). Even in Japan, there is an element of choice available in that MEXT provides a list of over twenty books to choose from for 2nd-

year high school English Communication classes - 24 for academic year 2023 (MEXT, 2022). In South Korea and China, too there are different offerings from various publishers, although Yuasa (2010) does mention that there may not be such a wide selection available in South Korea. This appears to be similar to the situation in China (Mao, 2023).

MEXT's control of textbook content and format has been criticized over the years, and as recently as this year, Igarashi (2023) draws attention to the fact that the ministry's own language education policy of developing learners' intercultural communicative competence is not sufficiently reflected in the nine textbooks she examined from three different publishers.

2. Some Previous Studies Related to Textbooks in the Three Cultures

According to Yuasa (2010) aims differ for Korean and Japanese textbook producers, with the Korean materials' focus being on enabling learners to express themselves and exchange ideas in English, whereas their Japanese equivalents aim to stimulate students' interest in foreign culture and generally encourage a "communicative attitude".

Yuasa found that primary school children in Korea were much better prepared for English lessons at the higher level they would encounter in junior and senior high school than Japanese children of the same age, their English abilities already showing a noticeable difference which was linked to the level and types of language activity in their textbooks (Yuasa, 2010: 149). However, this difference was not observed at the senior high school stage, although the gap between junior and senior high school materials was larger in Japan.

All textbooks in the three countries emphasize the importance of learning about foreign cultures as well as language knowledge, and all of them include some focus on their native cultures in contrast to others. However, the Chinese seem to be more at pains to make sure that there is sufficient mention or illustration of Chinese elements. Lu and Wang (2020) state quite clearly that "The Chinese elements are a symbol and spiritual image, and a component of world element diversity". Lu and Wang do stress that they are concerned with improving teachers' cultural awareness in the context of English teaching and raising students' cross culture teaching and learning, but conclude that the proportion of Chinese elements presented should be increased. This was also supported by Shen (2019), who first describes how textbooks in the 2000s still tended to focus on language knowledge and cultural content was either lacking or not well organized. She expresses the view that EFL learners in senior high school need to "acquire a profound knowledge of culture in relation to native culture and target culture" in addition to a good command of linguistic knowledge. It is her belief that too much importance has been placed on target culture. In 2009, Liu was concerned about how the (then) new curriculum goal of Cultural Awareness – to include cultural knowledge and understanding, and also competence in cross-cultural communication – could be successfully implemented throughout China in view of the situation in which curriculum and textbooks changed, but not teaching methods, nor methods of assessment. His concern about the quality of teaching in rural versus urban areas, even though the same basic textbooks are set, is echoed years later by Mao (2018).

Kwon (2009) also mentions the significance of teacher training and abilities, referring to Korean English education. He does not consider that the government's solution of hiring English conversation instructors for schools would necessarily improve the standard of teaching, since individuals without formal teaching qualifications could be employed. Chang and Owada (2021) compared cultural diversity and cultural identity included in English

textbooks in Korea and Japan. They found that "both countries experienced cultural diversity through English education and introduced their cultural pride to Western culture to realize the goal of strengthening global capabilities." They believe that English textbooks in both Korea and Japan are still firmly oriented toward American and British cultures. They also observe that there is a disconnect in terms of featuring cultural sections, but failing to relate them to the learners' real-life experiences. They found that Japanese and Korean textbooks had similar formats and introduced cultural contents from many countries.

Both Chung and Owada (2021) and Igarashi (2022) advocate the need for textbooks to extend the range of English norms to include more diversity in varieties of English, especially from the outer/expanding circle. Igarashi quotes the MEXT (2012) goal of preparing learners to become part of a globalized world that is both linguistically and culturally diverse.

This brings us to our main question which concerns the relationship between the various forms of content and format of the textbook and outcome in terms of international rankings mentioned above.

3. Method

First, we must address the selection of textbooks for examination. Due to time restraints, affecting the availability of books and influenced by the fairly intensive nature of the study carried out, it was only possible to examine one textbook each from China and South Korea, as described here.

Two Japanese textbooks were examined, partly due to greater availability, but also since the Japanese materials were potentially contributing to poorer outcomes for their users than either the Korean or Chinese materials. The selection was based on comments from an experienced Japanese high school teacher (Igari, 2023) who has had the opportunity to use and assess various textbooks over her already long career. We chose to use those that were recommended, although our evaluation of some points might differ. The two books were *Crown: English Communication II,* published by Sanseido (Shimozaki, 2022), and *Vista: English Communication II*, also coincidentally published by Sanseido (Kaneko, 2022). *Crown* is a well-established series of English textbooks that have been employed in high schools for a very long time (we have in our possession a 1997 *New Crown* series, for example).

The Chinese textbook, *General English Textbooks (Compulsory), Level 2*, published by a division of the People's Education Press, was selected mainly through the suggestion of Anyi Mao (one of the authors) and proved to be more readily available than other officially published textbooks. The Korean choice was also based on the information provided by a former Korean student one of us taught. From Song's article, it appears that this is actually one of the non-prescribed books that is very widely used in the country (Song, 2021).

We began by considering relatively obvious points, including the appearance of the book covers and their size, and then counted and compared the number of units/chapters and the numbers of words and sentences used in each unit. We categorized words and sentences as carrying "main content" or serving purely "instructional" purposes, such as "Target", "Activity" or "Exercise". Words only listed in vocabulary lists in footnotes or side bars were not counted, although titles were included and captions with pictures, but not words that were part of a graphic illustration's design. Common abbreviations, such as *etc.* and *e.g.* were

counted as one word. Dates, such as *March 25th 1915* were counted as three words, and personal names were counted only once when they appeared repeatedly as the participants in a scripted model conversation. Sentences was taken to mean only full grammatical sentences and not parts of sentences as appearing in the exercises, unless these were readily completed with one easy word or with words/phrases readily available on the same page. We also quantified as accurately as possible the percentage of pages given over to illustration, pictorial or diagrammatic (which was roughly calculated separately, although later combined for statistical assessment).

We also further noted any special characteristics in terms of unit/chapter content, inclusion of audio scripts for listening material, extra practice materials in addition to the regular units/chapters, and layout.

4. Findings and Discussion

It must first be made clear that, although we were able to calculate some statistics for the purposes of assessing any potential relationships, our sample of only four textbooks could not hope to provide us with would be reliable enough to expect genuinely significant correlations to be found. Our aim was to examine the data in terms of word and sentence totals, the average number of sentences per page and the use of pictures and diagrams to see if such contents were likely to affect students' achievement in terms of EF EPI rankings or TOEIC scores.

The initial findings from the word and sentence counting can be found in Table 1 below, which for the sake of brevity does not include any of the category of "instructional" language.

Although the number of pages per book and the average number of sentences per page appear to be very obviously different, it must be borne in mind that the size of the pages was different for each country's textbooks. The Japanese books were both B5 format, as were other Japanese textbooks we did not examine, while the Korean textbooks we saw were all A4, including this one. The two sets of Chinese materials we were eventually able to obtain, including the one we analyzed, were an unusual slightly elongated A4 size. So, while it is a fact that the Chinese book had by far the highest average number of sentences per page, the pages were much larger than those of the Japanese textbooks.

Title	Pages	Words	Sentences	Av. Sentences per Page	% of Pages Devoted to Pictures	% of Pages Devoted to Pictures incl. Diagrams	EF (2022) Score	EF (2023) Score	TOEIC Score (2022)		
									Listening	Reading	Total
Vista：English Communication Ⅱ	98	8973	1018	10.39	20.07	20.69	475	457	309	252	561
Crown: English Communication Ⅱ	168	28151	2445	12.75	28.27	29.73	475	457	309	252	561
High School English Ⅰ	132	22135	1693	12.83	24.42	25.26	537	525	374	301	675
General English Textbook (Compulsory) Level 2	60	16548	1334	22.24	19.03	19.03	498	464	286	262	548

Table 1: Basic Findings
("Words" and "Sentences" in this table do not include instructional language.)

Our Japanese high school teacher informant (Igari, 2023) liked the *Vista* textbook because it had the vocabulary list in a side bar next to each reading passage, as well as at the end of the book, but it does mean that with the addition of footnotes the pages look rather crammed compared to the Chinese and Korean books, or even the *Crown* textbook. She found that the

Crown series was better suited to higher level students, especially those preparing to study English at university, since it was more intellectually stimulating. The *Vista* reading passages seemed especially designed for easier understanding, being printed in a larger font, with all instructional language being limited to either single word headings or two-word imperatives, such as "Study it!". This textbook also contained a considerable amount of Japanese language on every page, including the labeling of countries on maps. *Crown*, in contrast, used side bars and footnotes sparingly, and made little use of Japanese. There are many pages without either of these features. On the other hand, *Crown* makes more use of tables and charts to present background information. *Vista* exhibits considerable regularity in page layout from unit to unit, which particularly affects the style and quantity of illustrations, unlike Crown which shows regularity in the first half of the book, but variety in unit length in the latter half (presumably when students are becoming accustomed to the format.) This allows for more variety in layout where use of illustrations is concerned, especially in Unit 6, first in the second half, which contains a special double-page spread in full color on the topic of the Sagrada Familia (Shimozaki, 2022: 110-111). *Crown* also features focused exposure to words and cultural concepts from languages other than English in Unit 1 and an optional extra lesson, which consists of a reading passage and comprehension questions.

Both *Vista* and *Crown* contain Appendices with vocabulary lists and the scripts for listening exercises. *Vista* also has four additional reading passages and *Crown* has model answers for the writing tasks. The vocabulary lists in *Crown* are organized as all vocabulary in each unit, functional expressions by the unit, and whole text vocabulary, which seems designed to make accessing words and expressions for later revision or further use easier. The number of units was similar, with eight in *Vista* and ten in *Crown*.

High School English 1 and *General English Level 2* had a smaller number of units, six and five, respectively, and in each textbook the length of all units was unvaried. *High School English 1* makes little use of Korean and *General English Level 2* contains almost no Chinese. This indicates an approach based on having learners see English as a fully functioning language from the outset, not simply a subject of study in school, which may be of limited usefulness outside the classroom. (Also largely true of the *Crown* textbook.) Both exhibit variety in terms of layout and size of illustrations, breaking up any monotony in page appearance.

In *High School English 1*, information is often arranged in the form of tables, perhaps for quick access, or to make it easier to remember. There is a "Click on Culture" section at the end of every unit, which focuses on aspects of Korean and other cultures. An especially noticeable feature in the Korean textbook is that web addresses are included for the sources of information in the main reading passages and "Click on Culture" sections in every unit. This suggests that students are encouraged to further their own research into the topics and also be used to the idea of needing to cite sources in their own writings. At the end of this textbook, there is a special lesson based on a movie – mainly dialog and listening comprehension, that is exercises using language. The Appendices contain scripts for listening activities and answers to all exercises, and full details of all sources for the "Click on Culture" information and photos used.

General English Level 2 is unique in featuring a video component as an integral part of every unit, at the end of each unit, and in having an integrated workbook at the end of the main text which contains a wealth of extra practice material for each unit, especially grammar, reading and writing. Unlike the other textbooks, the Appendices do not contain any audio scripts or answers to exercises. They do contain a general vocabulary list, lists of words and expressions

used in each unit, points of grammar, and a list of irregular verbs. There are also notes for each unit, explaining particular expressions, but mainly concerning background information.

Potential Correlations

	EF (2022) Score (Pearson's r)	EF (2023) Score (Pearson's r)	EF Main Indications (All results non-significant)	TOEIC Score (2022) (Pearson's r)	TOEIC Main Indications (All results non-significant)
Words	0.2028	0.2549	Small positive relationship	0.2806	Small positive relationship
Sentences	**-0.0755**	0.03375	Very small positive relationship	0.1121	Small positive relationship
Av. Sentences per Page	0.152	**-0.1219**	Very small negative relationship / Large positive relationship	*-0.3164*	Medium negative relationship
% of Pages Devoted to Pictures incl. Diagrams	**-0.0208**	0.1574	Small positive relationship	0.2801	Small positive relationship

* Figures in bold indicate a very small negative relationship, but this is viewed here as something of an anomaly, probably related to the very small number of cases being compared. The TOEIC result (in italics) is much more remarkable, however.

Table 2: Initial Examination for Potential Correlations with EF Rankings/TOEIC Scores

	EF (2022) Score (Pearson's r)	EF (2023) Score (Pearson's r)	EF Main Indications (All results non-significant)	TOEIC Score (2022) (Pearson's r)	TOEIC Main Indications (All results non-significant)
Av. Words per Unit	0.4606	0.6279	Medium → Large positive relationship	0.5158	Large positive relationship
Av. Sentences per Unit	0.7099	0.5991	Large positive relationship	0.4887	Medium positive relationship
Av. Sentences per Page	0.152	**-0.1219**	Small positive relationship → Very small negative relationship	*-0.3164*	Medium negative relationship
% of Pages Devoted to Pictures incl. Diagrams	**-0.0208**	0.2108	Very small negative relationship → Small positive relationship	0.2801	Small positive relationship

* Figures in bold indicate a very small negative relationship, but this is viewed here as something of an anomaly, probably related to the very small number of cases being compared. The TOEIC result (in italics) is much more remarkable, however.

Table 3: Examination for Potential Correlations with EF Rankings/TOEIC Score: Average Words and Sentences per Unit

First, we tested for normal distribution using the Shapiro-Wilk test, which indicated a fairly normal distribution, although with the small number of groups compared caution is advisable. We calculated for both total word and sentence counts for the whole books and for the average number of words and sentences in each chapter or unit. As can be seen from Tables 2 and 3, there were no statistically significant results, but several noticeably more positive results in the case of average words and sentences per unit indicated potential relationships, which would require further investigation with a larger data set. The results for "Average Number of Sentences per Page" seem most unreliable, given how they vary from negative to positive on the different measures. The most promising relationship appears to be between "Words" and "Average Words per Unit" and the EF and TOEIC scores, which reinforces the idea of a link between exposure to volume of language and acquisition, echoing Kim and Krashen's advice on extensive reading of over 25 years ago (Kim & Krashen, 1997). Exposure to more sentences is also beneficial, although a weakening effect which we originally observed for the inclusion of instructional language is likely to indicate that, in order to be of benefit, the exposure should be to full grammatical sentences that carry more meaning than only basic one- or two-word instructions. The effects for pictures seem to be quite positive overall, and may be increased

through encouraging students to interact with the content of illustrations and make connections with the information presented in other forms (See Ihata, 2017).

Conclusions

As expected, we cannot draw any firm conclusions from the present study, but it has been a useful exploration to suggest areas for further investigation and to encourage Japanese schools to make efforts to engage their students more actively in their own learning. Certainly, South Korea is achieving better outcomes for its English education than either Japan or China, perhaps as a result of its tendency to emphasize the practical use of the language through more output activities and an active learning approach that is already well-established in its materials. However, now that elementary schools in Japan are also focusing on English education more earnestly, we may begin to see improvement, especially as the effects of the coronavirus pandemic recede and study abroad programs and international travel in general resume and recover, increasing possibilities for university students and other young people in particular. For language learning of any kind to be effective, it needs to be seen as meaningful, and not only for passing tests (although that can also motivate some learners). Children and young people are naturally curious about the world around them and, increasingly, the world outside their immediate surroundings. Expanding the range of cultures from a focus on native anglophone countries may be a good way to stimulate English learning, as some researchers mentioned here have pointed out.

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Employability on Self-Perception Among IT Students: The Effects of Intrinsic Motivation and Academic Performance

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Abstract

The primary objective of higher education in Thailand is to prepare students for future careers. However, some students are uncertain about their ability to find employment. Therefore, this study investigated the relationship between intrinsic motivation, academic performance, and self-perceived employability, and aimed to create a predictive model of IT students' self-perceived employability. The sample group for the study comprised 420 students from the Department of Information Technology, Faculty of Business Administration, Rajamangala University of Technology, from nine campuses across Thailand. Data was collected using online questionnaires and analyzed using Pearson's correlation coefficient and multiple regression analysis. The results showed that intrinsic motivation, academic performance, and self-perceived employability were positively correlated. The multiple correlation coefficient was between 0.75 and 0.95. Additionally, it was found that intrinsic motivation and academic performance can predict students' self-perceived employability with a significance level of 0.05. The findings of this study suggest that the teaching and learning process should be designed to improve intrinsic motivation and academic achievement. This may be accomplished through providing students with stimulating and engaging learning experiences, as well as chances to learn in a supportive setting. As a result, students may gain the confidence they need to find a job after graduation.

Keywords: Intrinsic Motivation, Academic Performance, Self-Perceived

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Introduction

Rajamangala University of Technology (RUT) is a public university that was established in 1975 under the Rajamangala University of Technology Act of 2005. Since January 18, 2005, it has been under the supervision of the Office of the Higher Education Commission and comprises nine campuses across all regions of Thailand (Act Rajamangala University of Technology, 2005). The university's mission is to provide quality education that equips graduates with academic knowledge and practical skills to meet the demands of various sectors. Information Technology (IT) programs, such as business computing, digital business information systems, and others, are offered at all RUT campuses.

According to a survey by the Office of the Permanent Secretary for Industry, Science, Research, and Innovation in 2022, 73.96% of the respondents reported being employed, 2.91% were continuing their education, while 23.12% were unemployed (Office of the Permanent Secretary, M. o. H. E., Science, Research and Innovation, 2023). However, the employment outcomes of 10,542 RUT graduates in the past five years showed that 70.54% secured employment or self-employment within one year, 3.58% pursued further education, while 15.88% remained unemployed (Isan, Student Development Division Rajamangala University of Technology, 2023) This data suggests that despite most students finding a job, a considerable proportion of graduates failed to do so, which implies a waste of their educational investment (Coetzee et al., 2019).

The issue of graduate unemployment can be partly attributed to their low self-confidence in their abilities (Ergün et al., 2021) and their perceived skill gap with employer expectations (Coetzee et al., 2019). Some factors that can contribute to this lack of self-confidence are insufficient knowledge and skills in their field of work (Abelha et al., 2020), low socioeconomic status (Kassa et al., 2022), and lack of critical thinking application from academic studies. This can result in students having low self-perceived employability for the workplace (Yau Hsiung Wong, 2019).

One of the main goals of higher education is to prepare students for their future careers. Therefore, it is essential to implement educational strategies that foster the development of knowledge, skills, and relevant professional experiences before entering the labor market. One crucial indicator of student development is self-perceived employability (Räty et al., 2019). Self-perceived employability is the extent to which a student believes that they have the skills, knowledge, and abilities to secure and retain a job (Harry et al., 2018) and perform effectively according to the requirements of the organization (Ergün et al., 2021). Based on the literature, two factors affect employability outcomes: intrinsic motivation and academic performance.

Intrinsic motivation is an internal drive that stems from personal characteristics such as curiosity, autonomy, satisfaction, and enjoyment, which motivate individuals to engage in various activities voluntarily (Ryan & Deci, 2000; Richard & Ryan, 2020). Intrinsic motivation arises from one's own interests without expecting external rewards or pressures, involving interest, enjoyment, challenge, and personal exploration (Harter et al., 1981; Amabile et al., 1994; Deci et al., 1985).

Individuals who are highly intrinsically motivated tend to approach their tasks with enthusiasm, commitment, and accountability, and the drive to pursue goals without depending on external regulations (Buzdar et al., 2017).

Another important factor that can affect self-perceived employability is academic performance. Academic performance refers to the degree of satisfaction with educational outcomes that align with future career aspirations (Rothwell et al., 2008). Academic performance can be measured by grades or scores, attitudes (Alani et al., 2021) and readiness to learn through various types of assessments, such as performance, knowledge, skill, and self-assessments (Ergün et al., 2021).

Based on the above information, the present study aims to investigate the relationship between intrinsic motivation, academic performance, and self-perceived employability of IT students, and to create a predictive model of IT students' self-perceived employability of IT students at RUT's Faculty of Business Administration in Thailand using intrinsic motivation and academic performance as predictor variables. These variables are worth investigating because they can influence IT graduates' career decisions, satisfaction, and outcomes in a dynamic and competitive labor market. The findings of the study will inform the design of learning processes that enhance students' self-perceived employability and offer a guideline for revising the curriculum and supplementary teaching activities that enable learners to gain confidence and develop essential skills according to their needs and expectations for future employment.

Purpose of the Research

This study has two primary goals: (1) to investigate the relationship between intrinsic motivation, academic performance, and self-perceived employability of IT students; and (2) to create a predictive model of IT students' self-perceived employability. The specific research questions were:

− What are the correlations among intrinsic motivation, academic performance, and self-perceived employability among IT students at RUT's Faculty of Business Administration in Thailand?

− Can intrinsic motivation and academic performance predict self-perceived employability among IT students at RUT's Faculty of Business Administration in Thailand?

Methods

Participants and Procedures

The questionnaire respondents are made up of 420 undergraduate students majoring in IT from nine RUT campuses in Thailand. Table 1 shows the results of the general data analysis of the questionnaire respondents.

	Variable	Frequency	Percent
Gender	male	160	38.10
	female	260	61.90
Age	18-19 years	46	10.95
	20-21 years	222	52.86
	22-23 years old	111	26.43
	For more than 23 years	41	9.76
GPA	Less than 2.01	22	5.24
	2.01 - 3.00	166	39.52
	3.01 - 4.00	232	55.24

(N=420)

Table 1: Demographic profile of respondents

Table 1 shows the demographic characteristics of the respondents. There were 260 female students (61.90%) and 160 male students (38.10%) among the 420 responders. The respondents' ages ranged from 18 to 23 years, with the majority being 20-21 years old (222 students, 52.86%). The respondents' cumulative GPA varied from 2.01 to 4.00, with the majority having a GPA of 3.01 - 4.00 (232 students, 55.24%), followed by a GPA of 2.01 - 3.00 (166 students, 39.52%) and the lowest GPA of less than 2.00 (22 students, 5.24%).

Instrument and Procedure

Instrument Development

The questionnaire was developed by adapting and combining two existing instruments: (1) an intrinsic motivation questionnaire developed by Harter et al., (1981) which was applied by Lepper et al., (2005) to measure intrinsic motivation among university students; and (2) a self-perceived employability measurement questionnaire developed by Rothwell et al., (2008); Wittekind et al., (2010); and Álvarez-González et al., (2017) to assess employability among university students. The questionnaire consists of 61 items characterized by 5 levels of response: 5 = "Strongly agree," 4 = "Agree," 3 = "Moderately agree," 2 = "Disagree," and 1 = "Strongly disagree."

Instrument Validation

The questionnaire was evaluated by three experts in the fields of computer science and education. Content validity indices ranged from 0.60 to 1.00, with an average score of 0.67. After revising the questionnaire based on the experts' recommendations, it was piloted with a sample of 30 participants, who measured three key constructs: intrinsic motivation, academic performance, and self-perceived employability. The Cronbach's alpha coefficients for these constructs were 0.89, 0.79, and 0.93, respectively. According to Table 2, a Cronbach's alpha coefficient of 0.7 or higher indicates acceptable internal consistency (J. C. Nunnally, 1994).

Dimensions	Number of items	Reliability
Intrinsic motivation	16	0.89
Academic performance	4	0.79
Self-perceived employability	13	0.93

Table 2: Cronbach's α value of each dimension

Data Analysis

Correlation Analysis

The relationships between intrinsic motivation, academic performance, and self-perceived employability were analyzed using Pearson's correlation coefficient.

Regression Analysis

stepwise multiple regression analysis was conducted to develop a predictive model for students' self-perceived employability based on intrinsic motivation and academic performance."

Results

Analysis of the relation between intrinsic motivation, academic performance, and self-perceived employability.

Variable	Intrinsic motivation	Academic performance	Self-Perceived employability
Intrinsic motivation	-		
Academic performance	.83**	-	
Self-perceived employability	.95**	.91**	-
Mean	3.72	3.92	3.71
Standard deviation	0.15	0.10	0.12

**p<.001 (N=420)

Table 3: Descriptive data and Pearson correlations for the variables

Table 3 indicates that the variables of intrinsic motivation, academic performance, and self-perceived employability are statistically significantly correlated at the 0.01 level with correlation coefficients ranging from 0.83 to 0.95. The highest correlation coefficient was found between intrinsic motivation and self-perceived employability (r = 0.95), followed by academic performance and self-perceived employability (r = 0.91). The lowest correlation coefficient was found between intrinsic motivation and academic performance (r = 0.83).

A stepwise multiple regression analysis was conducted to create a predictive equation for students' self-perceived employability based on intrinsic motivation, extrinsic motivation, and academic performance.

Model		Unstandardized Coefficients		Standardized Coefficients		t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta				Tolerance	VIF
1	(Constant)	.035	.058			.604	.546		
	IM	.499	.017	.622		29.658	.000	.314	3.182
	AC	.464	.025	.390		18.604	.000	.314	3.182
Dependent Variable: Self-perceived employability $R^2 = 0.942$; Adj $R^2 = 0.936$ F = 3404.039; Sig. = 0.000									

Note: IM = Intrinsic motivation, AC = Academic performance
SPE = Self-perceived employability

Table 4: The standardized regression coefficients of the predictor variables
for students' self-perceived employability

Table 4 presents the standardized regression coefficients of the predictor variables for students' self-perceived employability. The results showed that intrinsic motivation and academic performance explained 94.2% of the variance in students' self-perceived employability (R^2=0.942). The adjusted R-squared value was 0.936 (93.6%). Both intrinsic motivation and academic performance were significant predictors of students' self-perceived employability at the 0.05 level. Intrinsic motivation had a beta coefficient of 0.499. This means that other variable are held constant if the importance of intrinsic motivation is increased by 1 unit, the self-perceived employability will be increased by 0.499.

Academic performance had a beta coefficient of 0.464, indicating that when other variable are held constant if the importance of academic performance is increased by 1 unit, the self-perceived employability will be increased by 0.464. The standardized regression equation for predicting students' self-perceived employability from intrinsic motivation and academic performance was as follows:

$$SPE = 0.35 + 0.499IM + 0.464AC$$

The above model shows that intrinsic motivation had a stronger effect on self-perceived employability than academic performance. Both of these independent variables had significant positive impacts on students' self-perceived employability.

Conclusion

This study investigated how intrinsic motivation and academic performance influenced self-perceived employability among IT students from nine campuses of the Faculty of Business Administration, RUT in Thailand. The results showed that intrinsic motivation was the strongest predictor of self-perceived employability. This finding implies that learning activities should be designed to enhance skills and training that foster intrinsic motivation and self-perceived employability among learners. Activities such as hands-on practice through experiential learning or the use of supplementary learning media to create problem-solving games, for example, can help learners better understand concepts, boost their creativity, and foster their enthusiasm, curiosity, and problem-solving skills (Ryan & Deci, 2000; Richard & Ryan, 2020). These skills are critical for increasing problem-solving, communication, and teamwork (Yau Hsiung Wong, 2019). These skills can help learners enhance their learning outcomes and perceive their employability more positively, increasing their chances of

finding work after graduation. Academic performance was also related to self-perceived employability in a positive way. Self-confidence, enjoyment of learning, motivation, effort, persistence, excitement for learning, and engagement in activities that improve learning experiences are some of the elements that might contribute to strong academic performance (Rothwell et al., 2008). As a result, developing activities that aid in the improvement of skills and learning outcomes, such as problem-based learning (PBL) (Ali et al., 2019), can assist raise self-confidence in work-related abilities (Hayat et al., 2020). This is because activities that enhance learning experiences through research processes and problem-solving in simulated settings allow learners to develop new information on their own, which can boost their confidence in their skills (Sheeba Sardar Ali, 2019; Shi et al., 2021). According to this study, the teaching and learning process should aim to increase intrinsic motivation and academic performance in students (Buzdar et al., 2017). This may be accomplished by offering interesting and dynamic learning experiences as well as fostering a supportive learning atmosphere (Alani et al., 2021). Consequently, students can improve their self-perceived employability and prepare for future careers.

Acknowledgments

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University Student Perception Regarding the Poster Tour Method

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Abstract

The following research is descriptive in nature and the proposed objective is to show the student's perception of the application of the poster tour method during the school semester. To obtain the sample we used the non-probabilistic sampling technique by convenience, this leads us to define a sample composed of 20 students who make up the group C2-6 of the Accounting career in a semi-school mode, of the Academic Unit of Accounting and Administration belonging to the Autonomous University of Nayarit. For the collection of information, a survey structured by closed type variables was used, without the participation of a pollster (self-administered), that is, automated by means of electronic mail, defining the survey as a data production technique. It should be noted that, within the results obtained, this type of method was effective for understanding, sharing and organizing information, having as main benefit the learning and teaching, demonstrating a greater participation by the student. Likewise, the student's perception is that it is an interactive and attractive method. Finally, the implementation of the poster tour is revealed as a valuable tool that successfully promotes benefits, increasing student confidence and interest in an effective way.

Keywords: Academic Education, Educational Innovation, Educational Methods, Perception, Teaching

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Introduction

The innovation of pedagogical tools that nowadays arise with school and academic changes, the teacher must update the way to implement strategies and methods that detonate the creativity and intellect of the students who are in their school development, this type of methods arise with the need to help teachers and students, allowing to clarify the understanding of the topics covered in class, in the same way, applying interactive teaching and learning.

Thus, the objective of this research is to know the student's perception of the application of the poster tour method during the school semester. That is why, teachers seek ways to have support with tools, techniques and teaching methods that facilitate the understanding of the topics. We can say that, in order to counteract this type of problems, the aforementioned method is made known.

In this way, a poster is more than an article or a simple exhibition, which stands out in another format, it should not be considered as a second-line communication tool. A good poster or poster should lead the audience to use visual logic with hierarchy, which emphasizes the main points of the work (De La Cruz-Vargas et al., 2016). Likewise, a poster can be complemented with photographs, graphics, testimonials, among other types of elements, then it can be defined that a poster is a large sheet in which students organize what they have learned, allowing them to share the information with their classmates or audience in general, thus being one of its important characteristics to have feedback and understanding of the topics discussed (Mejía and Kurita, 2023).

Similarly, the poster is a way of exposing and presenting the results of a research or school work, and its use has become frequent with the appearance of its electronic and virtual version, which in its entirety is a method and tool for pedagogical work (Barahona et al., 2023). This new type of teaching requires student-directed classroom activities. In this sense, the educational form exemplifies this model, since it does not allow the integration of skills in an efficient way, but organizes different teaching methods according to these learning (Marchante and Herrero, 2022). Ultimately, a poster is displayed in the context of a scientific or academic event, intended to announce the most relevant results and conclusions of a research work, through a combination of text with images, graphics, tables, forming a high potential communication channel (Giráldez et al., 2016).

Literature Review

What is a Poster

A poster in a scientific meeting is an enlarged graphic representation containing a title, the name of the authors, text and figures explaining a project, a research, an experience (ECOURBAN, n.d.). Therefore, posters are an enormously educational tool and perfectly valid even in the current era in which digital exhibitions predominate through various types of screens and image projections (Garcia-Manso, 2020).

So an effective poster is a highly condensed version of a research paper, consisting mainly of a visual presentation of the data and enough supporting text to provide the appropriate context, interpretation, and conclusions of the research paper (Berbey-Alvarez et al., 2017). It is useful because it shows in a brief and organized way the results of actions and knowledge

developed in each discipline, solutions to problems, new paradigms, teaching strategies, etc. This type of communication is often carried out at conferences and academic events, and is accompanied by brief explanations or oral presentations designed to capture the attention of a specific audience (Pérez et al., n.d.). Likewise, posters are a method of dissemination of scientific knowledge in which relevant and interesting elements are articulated for universal communication in instances of scientific and academic events. In design, it proceeds in the form of a panel and is displayed physically or digitally (Lepez, 2020).

The Poster Tour in Teaching

The poster tour method determines the direct communication with students allowing to transmit in a harmonious and visual way the necessary information, enabling the improvement of understanding, comprehension, discussion and exchange of ideas (Clari et al., 2011).

Likewise, the application of this type of method supports teachers and students in the transmission of knowledge, teaching and learning necessary for the development of academic activities, as can be seen in figure 1.

Figure 1. *Aspects of the poster tour method*
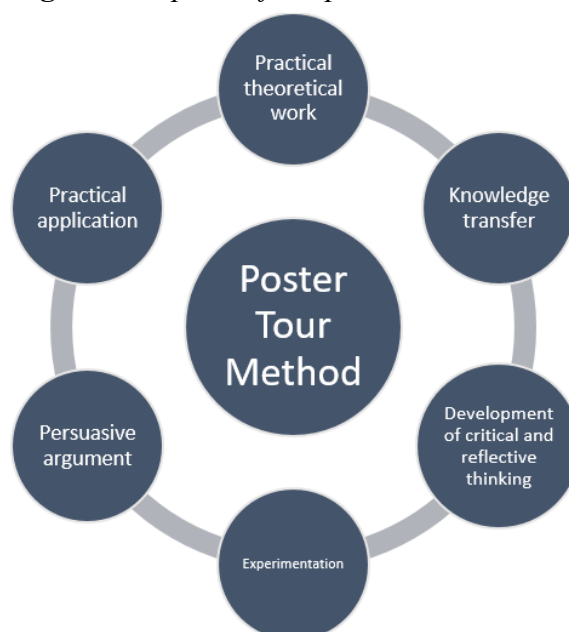
Source: own elaboration based on Clari et al. (2011)

From the above, the poster is an alternative to oral communication that has the same purpose but also offers the possibility of presenting studies, projects, experiences that for various reasons cannot be presented as oral communication (ECOURBAN, n.d.). In other words, starting from a basic scheme proposed by teachers, students are given the opportunity to be active constructors, discover, transform and manage their own knowledge, adapting the thematic demands to their own process of capturing and shaping knowledge (Vergara and Sanz, 2011).

It is worth mentioning that, the benefits for authors can establish new connections with other authors who work in similar fields and who have shown interest in what they present in their posters. On the other hand, authors who are not present can examine a large amount of

information quite quickly and can select the most interesting information and discuss it directly with the authors themselves (Conejero and Jordán, 2015). Their visual appeal and familiarity when read allows researchers to make comprehensive presentations and participate in the conversations and discussions that can be generated by the research objects presented (Barahona et al., 2023).
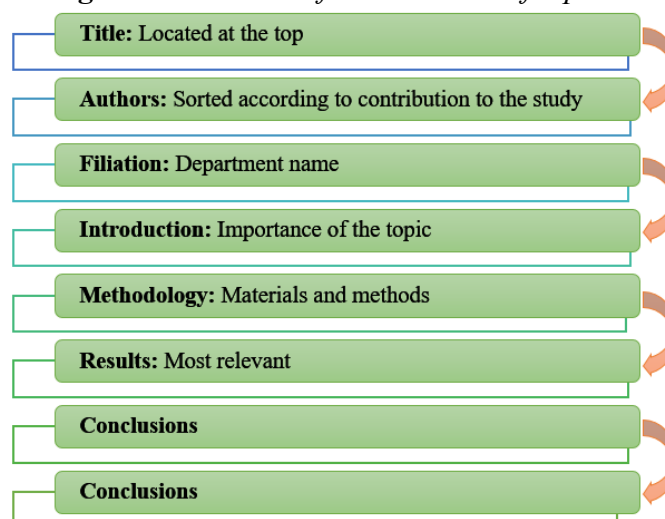
In this sense, the approach allows students to perform analysis of situations and empirical facts, and make predictions about results, experimental tests and structured and integrated conclusions for learning, focusing on the development of reflective, critical and higher-level thinking skills. In this way, it helps to address problem solving, leading students to reasoning, a process that involves innovation, discovery, mismatch with prior knowledge, and construction of new knowledge (Cuesta, 2019).

The Poster as a Pedagogical Tool

With the production of posters, students use a series of technological applications, such as mobile devices, computers, projectors, etc., which can increase their motivation and, therefore, improve their academic performance (Marchante and Sanz, 2021). With this in mind, the poster serves as a work tool and pedagogical support that establishes a link with teachers and students for school work, which encourages constant participation and interaction between work groups.

Accordingly, posters stand out as an alternative that presents research results through a combination of writing, reading and research. Its format facilitates public access to the information, in addition to allowing its reading and comprehension and in-depth review of the content (Rojas et al., 2022). The following are the elements of the structure of a poster (figure 2).

Figure 2. *Elements of the structure of a poster*

Title: Located at the top

Authors: Sorted according to contribution to the study

Filiation: Department name

Introduction: Importance of the topic

Methodology: Materials and methods

Results: Most relevant

Conclusions

Conclusions

Source: own elaboration based on Pierdant et al. (2019)

Therefore, it is recognized that the poster models visualize and organize the information in such a way that the elements presented are capable of transmitting knowledge for a better understanding of the topics seen, having as a benefit the feedback to students or work groups.

Problem Statement

Starting from higher education, the objectives that are difficult as a teacher when teaching classes is the comprehension or understanding of certain topics seen by the student, making academic progress and performance during the semester impossible. That is why teachers seek alternatives to have support with tools, techniques and teaching methods that facilitate the understanding of the topics. We can say that, in order to counteract this type of problem, the poster tour method is used. To better illustrate the approach to the problem, the Ishikawa diagram (figure 3) is used to illustrate the problem.

Figure 3. *Problem statement represented with the Ishikawa diagram*
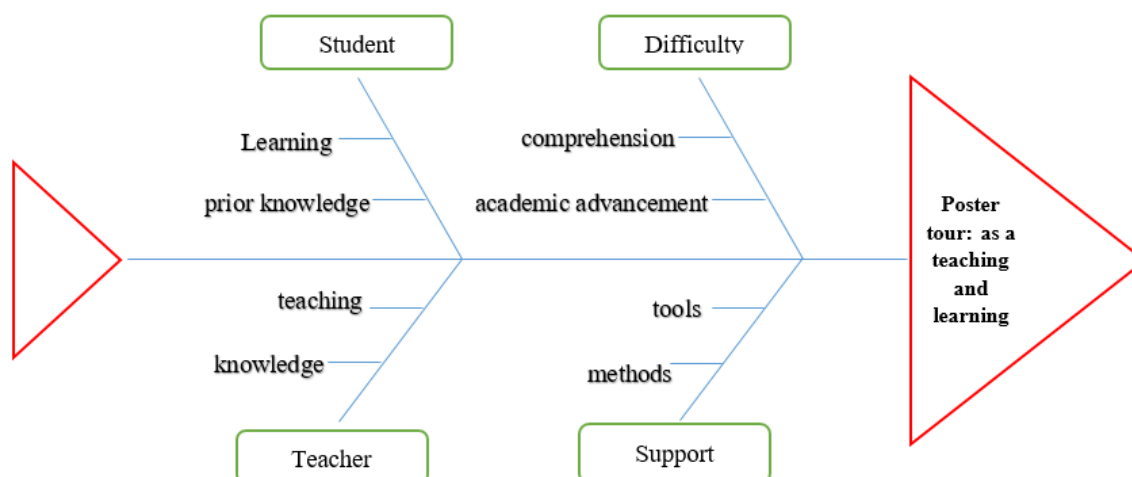
Note: That is why teachers seek alternatives to have support with tools, techniques and teaching methods that facilitate the understanding of the topics.

General Objective

The proposed objective seeks to explore and understand students' perception after the application of the poster tour method throughout the school semester.

Main Objectives

- To learn about the poster tour method
- To inquire about the benefits of the practice of the method in teaching-learning

Research Question

We can say that, from the above, the following research question is proposed: Has the implementation of this method contributed to the students' more active and effective understanding of the topics addressed?

Methodology

This research is descriptive in nature, which means that it aims to systematically address the characteristics of a particular situation. It is important to note that this type of study focuses on the description of situations or events, as illustrated in figure 4.

Figure 4. *Stages of descriptive research*
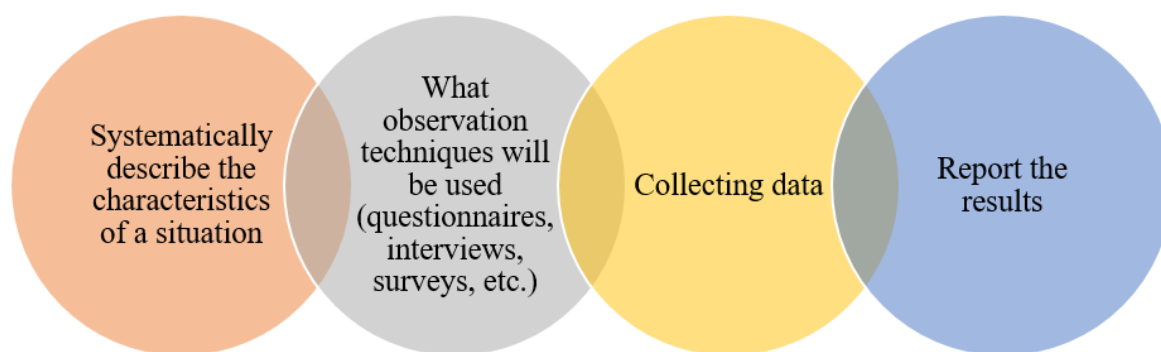
Source: Prepared by the authors based on Álvarez (2011).

According to Alban et al. (2020), they argue that the research describes some basic characteristics. Homogeneous phenomena, using systematic criteria that make it possible to establish the structure or behavior of the phenomenon. Under study, providing systematic information that can be compared with information from other sources.

Sample

To obtain the sample, the non-probabilistic convenience sampling technique was used, given that the sample is chosen according to the convenience of the researcher, allowing him to arbitrarily choose how many participants can be in the study (Hernández, 2021). This leads us to define a sample composed of 20 students who make up the group C2-6 of the Accounting career in a semi-schooling modality, of the Academic Unit of Accounting and Administration belonging to the Autonomous University of Nayarit.

Research Instrument

For the observation and data collection technique, a survey structured by closed-type variables was used, without the participation of an interviewer (self-administered), that is, automated by means of e-mail, defining the survey as a data production technique, which allows inquiring about the possible topics of the students (Katz et al., 2019).

Data Processing

For data processing, as indicated above, it was automated by means of email, where the survey was presented through Google forms, allowing data collection in the form of a survey (Faculty of Economics and Business, n.d.). Providing the relevant statistics for this research, where the results are presented in the form of graphs, performing their corresponding interpretation and analysis.

Results

Did you know the Poster tour method before, it is observed that 80% of the students do not know the referred poster tour method, while 20% refer that they already knew this method, in addition, the total (100%) of the students responded that the application of the method during the classes was easy for them, as shown in figure 5.

Figure 5. *Did you know the Poster tour method before?*
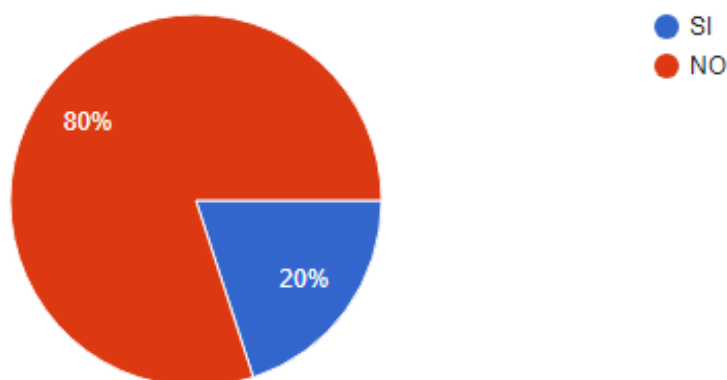

Is the practice of this method effective, students responded that the most effective practice focused on understanding information (100%), while 85% said that it is useful for sharing information, followed by 70% who mentioned that it is a method to achieve an optimal organization of information, as shown in figure 6.

**Figure 6.** *Is the practice of this method effective for?*
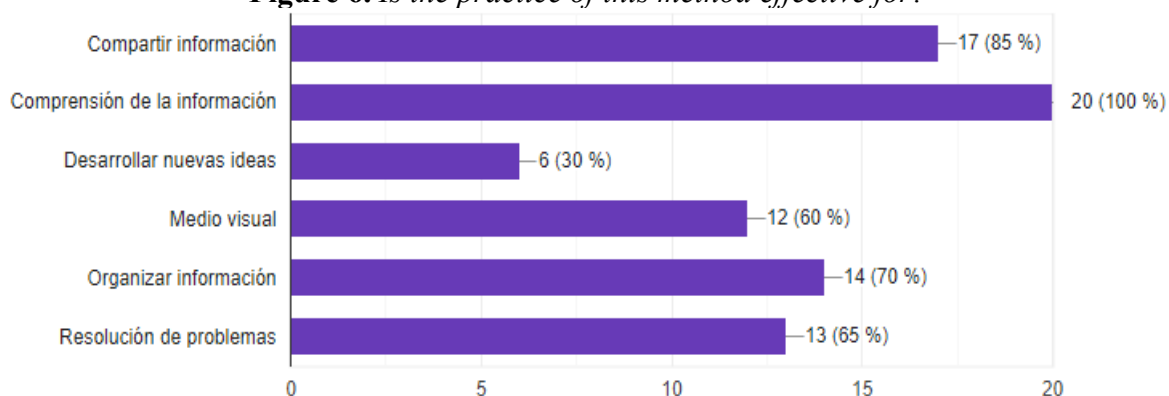
What benefits did the Poster tour method grant you, the student determines that learning-teaching (95%) is the most important benefit within higher education, while feedback (75%) and collective work (75%) follow the same trend as shown in figure 7.

Figure 7. *What benefits did the Poster tour method give you?*
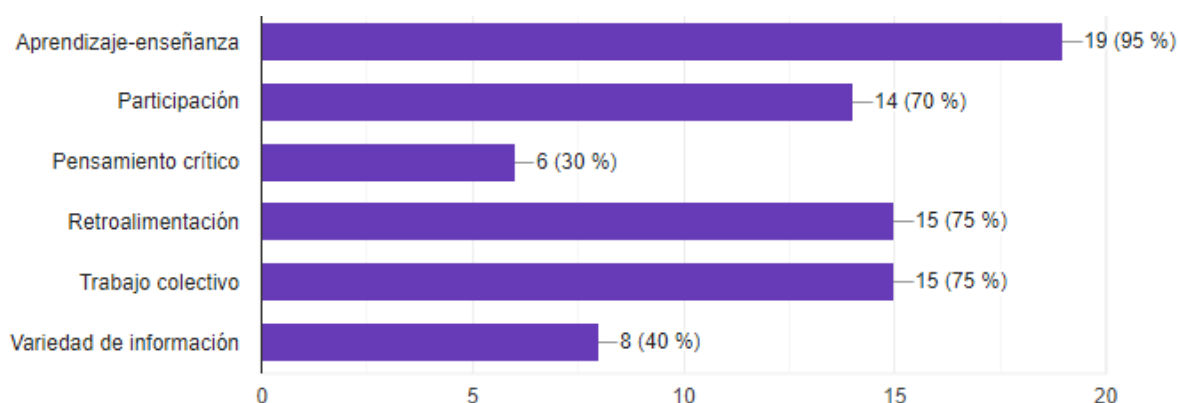
How do you define this type of method? 75% of the responses consider this method to be interactive, 70% consider it attractive and 65% consider it to be effective and innovative, as shown in figure 8.

Figure 8. *How do you define this type of method?*
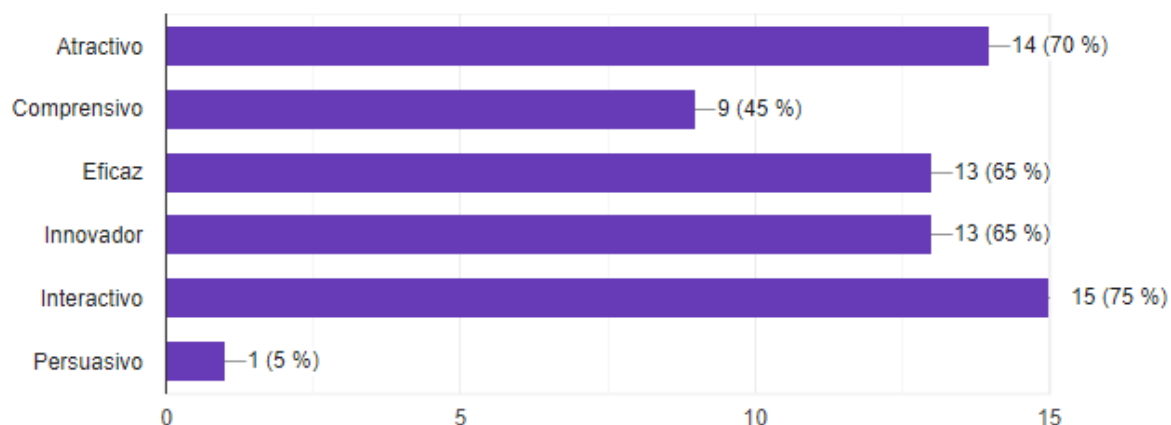
From the above, the practice of posters has shown very positive results in terms of students' commitment, interest and performance. It has contributed to the improvement of skills and attitudes such as information search and selection, synthesis capacity, independent work, group work inside and outside the classroom, oral and written communication, optimal time-space planning and good academic practice (Sánchez et al., n.d.).

Discussion

In this way, and following up on the research question: Has the implementation of this method contributed to students acquiring a more active and effective understanding of the topics addressed, the total (100%) of students surveyed gave a favorable and accurate opinion about the poster tour method, since they assure that this type of pedagogical tools promote interaction and active understanding in their studies and academic development, being a method of support for both teachers and students.

Similarly, the understanding of information and optimal organization are the most effective attributes for the practice of this method in students without leaving aside problem solving, i.e., the use of the poster tour as a tool for the effective presentation of research and academic results has a stable level of acceptance, being this a way to communicate and share in detail in the exhibitions (Almiñana et al., 2006).

Likewise, this method is defined as attractive, since it gives the opportunity to work the research and the proposed problems in a fluid way, having the interactive attribute, which defines the way of working as a team, consolidating the ideas of the members, who in a detailed way collaborate for the resolution of the practice or proposed research topics, giving the opportunity to be an innovative pedagogical tool for the learning and teaching of students, providing participation and critical thinking.

It should be noted that the strength of this method is developed in the feedback, which allows students to level their performance and performance within the educational institution, allowing solutions for the understanding of certain topics, in addition to carrying interactive learning dynamics that promote student motivation, since this type of method establishes the

dissemination of knowledge in society meetings and academic events (Castro-Rodríguez, 2022).

The use of posters as didactic tools has been suggested as a means to promote relevant skills in the professional training of students. The benefit of this approach is the social aspect, as it grants opportunities for academic networking, including teachers and other professionals (Canales and Schmal, 2013).

Conclusion

According to the results of the research, it can be observed that the application of the poster tour method is effective among students for the comprehension of information on certain topics discussed or seen during the semester. In the same way, the sharing of information by means of the poster generates motivation for the investigation of the proposed topics and in the resolution of problems derived from certain presentations, managing to capture the attention of the students.

Likewise, of the benefits shown and derived from the research, there is the learning-teaching, which proves to be a method for teachers and students, in support of academic and extracurricular activities, having also necessary and timely feedback for the fulfillment of the proposed objectives, another benefit is the collective work, since it teaches students the integration for the resolution of group activities.

In this way, the perception of the poster tour method is defined as an interactive method, which manages to implement the attractive and innovative, which effectively draws the attention of students, transforming the educational interaction, and also the way of giving objective and interactive classes. So from this, we can answer the research question posed: With the implementation of this method was acquired a more active and effective understanding of the topics covered by the student, in the affirmative can be answered, since the method applied during the semester was very useful and in the same way the student showed significantly an advance in their school activities, allowing this to develop skills and abilities that positively impact the university students, leading to another level of understanding the activities presented by the teacher, acquiring critical thinking and better participation. Finally, the implementation of the poster tour is a method that associates benefits to achieve the proposed objectives, which in an appropriate way generates greater confidence and interest in the students.

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